GAS

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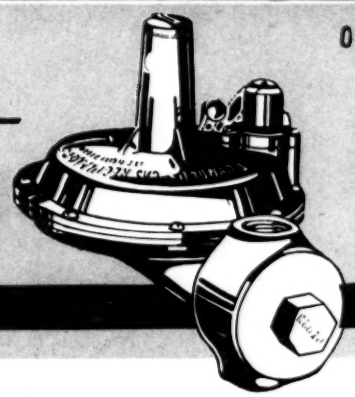
from origin to user—

it's **REYNOLDS GAS CONTROLS**



Reynolds builds a Regulator for every type of Gas Control installation. Proven by records of performance in actual operation, or by records of factory tests on new developments, every Reynolds unit—whether for high pressure or low—is a proven product.

For more than half a century, Reynolds has concentrated exclusively on Gas Control devices. Leaders in the Gas Industry use Reynolds Regulators with full confidence, and with good reason—for accurate Gas Control, by Reynolds, from one ton down to inches W. C., has been an accomplished result for many years.

GAS CONTROL *Since* **1892**

REYNOLDS BUILDS A COMPLETE LINE OF GAS CONTROLS

High Pressure Service House Regulators: Straight Lever Type—Models 10-20 Series. Toggle Lever Type—Model 30 Series.

Low Pressure Service or Appliance Regulators.

District Station Regulators, Auxiliary Bowl and Automatic Loading Device Optional.

High Pressure Line Regulators Pilot Loaded—Pilot Controlled.

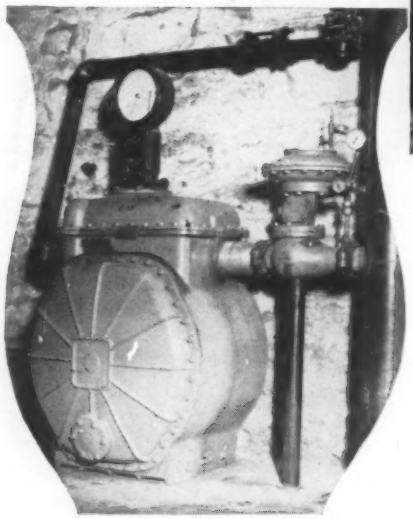
Toggle Type Regulators. Single Valve, Double Valve.

Seals: Dead Weight or Mercury Relief Valves; High or Low Pressure.

Back Pressure Valves, Automatic Quick-Closing Anti-Vacuum Valves.

Automatic Shut-off Valves, Lever Operated Valves, Louver Operated Device, Atmospheric Regulators, Vacuum Regulators.

RELIANCE REGULATORS PLAY AN IMPORTANT PART IN THE MANUFACTURE OF *fine Ceramics*



Above illustration shows an American Metric Ironcase Meter and Reliance Balanced Valve Regulator, which control the gas pressure in many of today's modern potteries.

The art of the potter consists of the shaping of certain earthy materials, usually clay, formed while moist and soft *and hardened by heat.*

In the preparation of fine quality pottery, a positive control of temperature in gas fired ovens is an absolute necessity. And it is in the positive control of these temperatures that Reliance Regulators play their important part.

For over thirty-four years Reliance Engineers have worked with industry to perfect the flawless, trouble-free performance built into every Reliance Regulator—performance you can depend on regardless of requirements.

Reliance Regulators are made in types and sizes most needed by the gas industry—production, distribution, industrial, domestic—for natural, manufactured and liquid petroleum gases.

Reliance bulletins give complete information. Write TODAY for your copy.

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AMERICAN METER CO. EST 1874

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1000 MERIDIAN AVENUE, ALHAMBRA, CALIFORNIA

U.S. STANDARDIZED MECHANICAL JOINT CAST IRON PIPE

Distribution engineers, who know that installing mechanical joint cast iron pipe is a time-saving and economical operation, will find it increasingly so now that the joint is *standardized* in sizes from 3″ to 12″. All parts are *interchangeable* with those supplied by other makers of mechanical joint cast iron pipe and fittings. Standardization will be extended to the larger sizes which, in the meantime, we are supplying with the regular U. S. Joint as heretofore.

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GAS

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Twenty-First Year of Publication

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Publication Office: **LOS ANGELES 14, California, 1709 West Eighth Street, DRexel 4337.**

Branches: **NEW YORK 17, 50 E. 42nd Street, MUrray Hill 2-4504; WASHINGTON, D. C., 306 National Trust & Savings Building, District 0215; CHICAGO 3, Illinois, 1064 Peoples Gas Building, WABash 2589.**

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October, 1945. Volume XXI. Number 10. GAS is published monthly by Western Business Papers, Inc., 1709 West Eighth Street, Suite 320, Los Angeles 14, California. Subscription price: United States, Mexico, Cuba, South and Central American countries (in advance), 25 cents the copy; two years for $3.00, $2.00 per year. Canada and all other countries, $3.00 per year. Entered as second-class matter August 20, 1936, at the post office at Los Angeles 14, Calif., under the Act of March 3, 1879. Member: Audit Bureau of Circulation; Associated Business Papers, Inc. Publishers: BUTANE-Propane News; Handbook BUTANE-PROPANE GASES; THE BOTTLED GAS MANUAL; WESTERN METALS.

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FLEXIBILITY

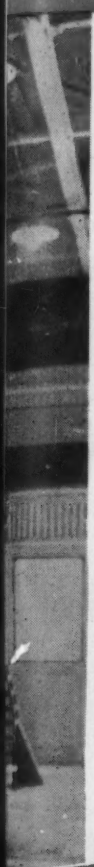
TYPE GMV ANGLE

Compressors

Two 8-cylinder, 800 hp GMV units installed in Columbian Carbon Company's gathering station at Goldtown, W. Va. Photo at right, showing compressor side, also shows variable clearance pockets. Exterior view at extreme right shows water tower for closed cooling system. Each unit drives its own tower and jacket water pumps.

New York Washington Bradford, Pa. Parkersburg, W. Va. San Francisco, Cal. Seattle, Wash.

the Keynote at Goldtown

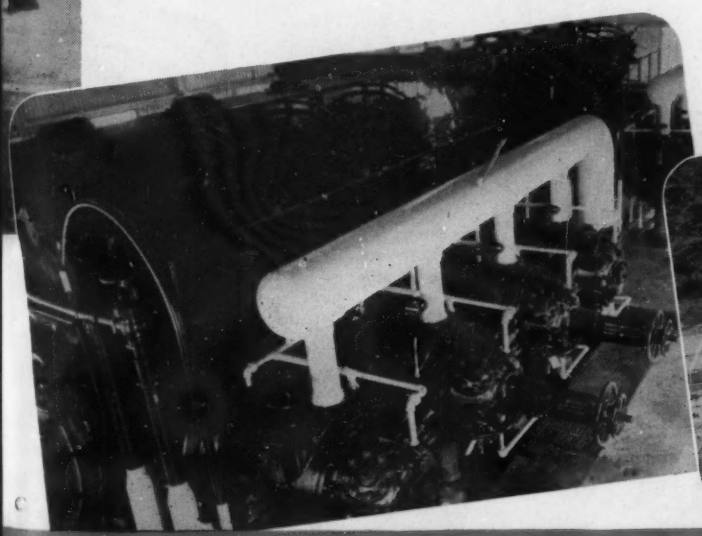


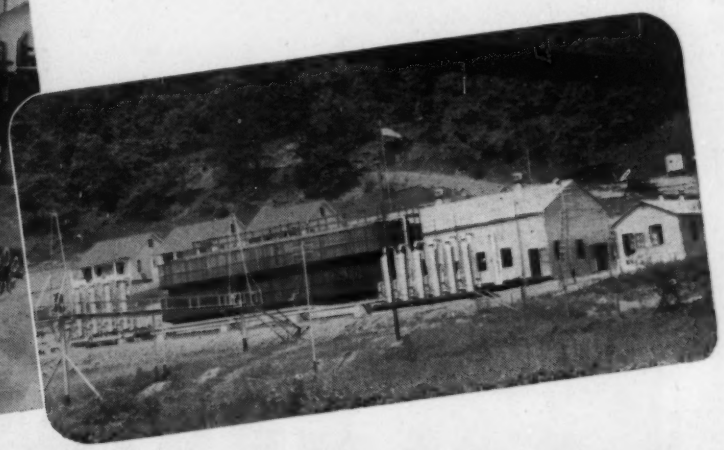
High thermal efficiency, durability, and like qualities are not the only things bearing on the outright economy and effectiveness of compressor installations. Often, an ***extremely flexible set-up*** is essential, requiring units that are wholly adaptable to such requirements.

The photograph at left shows two 800 hp GMV units in Columbian Carbon Company's gathering station at Goldtown, W. Va. — one of five Cooper-Bessemer powered stations delivering natural gas to Carbide & Carbon Chemicals Corporation at S. Charleston for their remarkable production of gas-derived synthetics.

Each 8-cylinder V-type GMV has four crankthrows and each crankthrow drives a double-acting compressor cylinder with built-in by-pass valves and with remote control suction valve lifters to permit single-acting operation. Moreover, two of each unit's cylinders are equipped with variable clearance pockets. Thus both engines may be operated at constant full load under a wide range of field pressures. It is a highly practical, extremely flexible setup.

The ability to power compressor cylinders of many types and sizes . . . to provide the required number of stages per unit . . . and to operate smoothly, with peak efficiency throughout the full normal speed range, makes the versatile GMV especially desirable wherever unusually critical or out-of-the-ordinary conditions prevail.





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These high pressures *take*

Cross-section of mercury chamber, METRIC orifice meter (of 50-inch differential range); one of the construction features important in the accuracy and dependability of this instrument.

Note the large area of the float at the end of the very long float lever, which insures accuracy and sensitiveness in the pen movement on the meter's chart.

This is but one of the many features of design described in detail in Catalog EG-2, which we shall be glad to mail you on request.

Outside adjustable pulsation dampeners in the bottom of the U tube connection are available.

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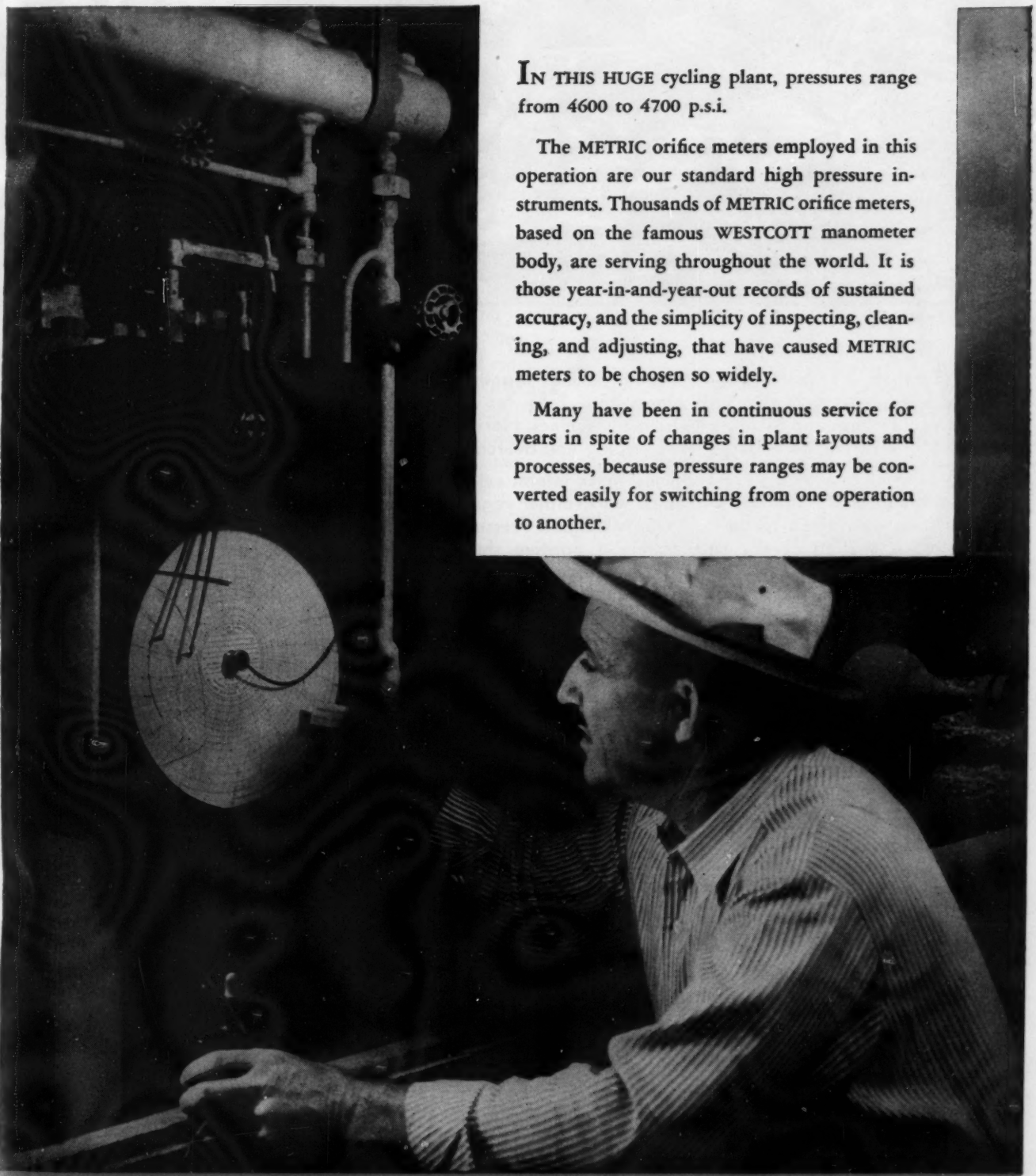
the measure of a meter



IN THIS HUGE cycling plant, pressures range from 4600 to 4700 p.s.i.

The METRIC orifice meters employed in this operation are our standard high pressure instruments. Thousands of METRIC orifice meters, based on the famous WESTCOTT manometer body, are serving throughout the world. It is those year-in-and-year-out records of sustained accuracy, and the simplicity of inspecting, cleaning, and adjusting, that have caused METRIC meters to be chosen so widely.

Many have been in continuous service for years in spite of changes in plant layouts and processes, because pressure ranges may be converted easily for switching from one operation to another.

METRIC orifice meter on input line of the Erath Cycling Plant, Erath, La., operated by the Texas Company under unitization agreement with other producers in the field. This is one of many standard METRIC orifice meters employed in the plant.

TEAMWORK WINS

In football it's teamwork—everyone pulling together—that wins the games. There is teamwork in this gas business, too. Take, for example, MUELLER Pressure Control Fittings and MUELLER Drilling Machines. Here are a couple of inseparable team mates that go a long way in helping you overcome many of your problems.

If you want to extend dead-end lines, make lateral extensions, replace old sections of a main, or do any kind of repair work, either regular or emergency, here are the tools with which to do it. With MUELLER Pressure Control Fittings you can isolate a section of the line, obtain a positive shut-off, and make necessary repairs or replacements, all with absolute safety and without shutting down the line. In addition, the fittings are installed at the exact spot desired regardless of the location of the gate valves in the line.

The "C-1" Drilling Machine shown is a husky team mate for MUELLER Fittings. With the air motor attached it literally eats its way through pipe. A more common use is making lateral connections by drilling through gate valves attached to nipples welded onto the main. Has both automatic and hand feed. Easily operated.

These and many additional features provide economies in time, manpower, and money not possible with slow, old-fashioned hand methods. If you are not acquainted with what Mueller Pressure Control Equipment can do for you write Dept. G-41 now for complete information.

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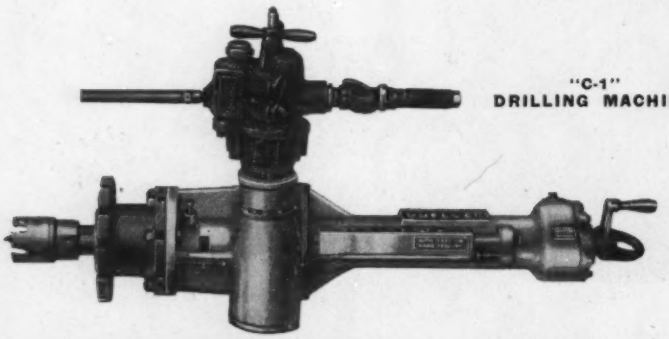
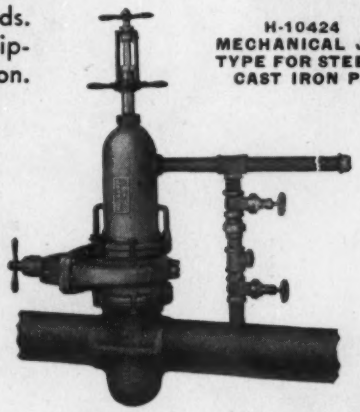
WELD TYPE FOR STEEL PIPE

H-10424
MECHANICAL JOINT TYPE FOR STEEL OR CAST IRON PIPE



"C-1"
DRILLING MACHINE



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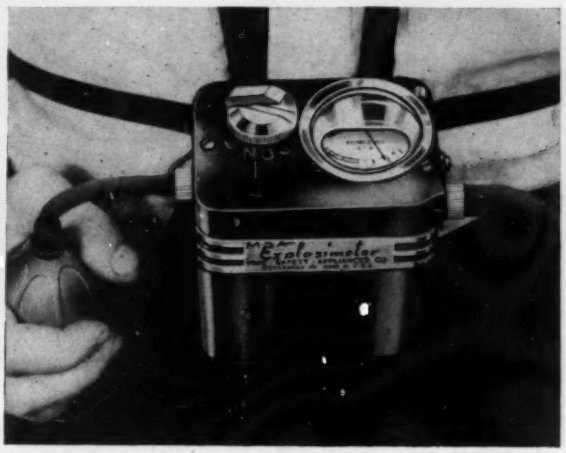
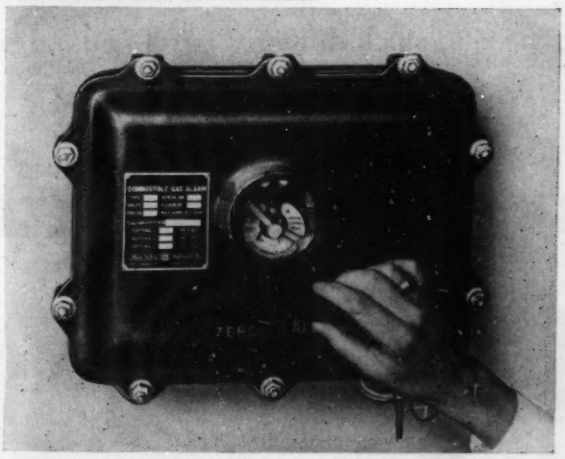
True one-hand operation, leaving the other hand free to handle the sampling line. Only one control to set—operation of aspirator bulb provides immediate response, showing concentrations below, within, or above the explosive range. Sturdily built, with a simple circuit that makes it foolproof in the hands of any workman. Standard batteries last 2 to 3 times longer—telltale bar on control knob reminds user to shut off current. Has many uses in utility and refinery service—ideal for testing sewers, manholes, locating leaks on gas lines.

Cat. No. DN-16386—
McDonald Explosimeter, complete





McDONALD COMBUSTIBLE GAS ALARM

An accurate, sensitive instrument which may be used either as an alarm or to maintain combustible concentrations to predetermined limits. Operates from 100% down to 10% of the explosive limit—even lower with a dilution system. Individually calibrated for the gas or mixture with which it will be used. Atmosphere to be tested is drawn in by a motor-driven fan over heated platinum wires. Combustible gases burn, increase resistance of wires, thereby closing electrical circuit which actuates alarm. White pilot lights go out, red warning light goes on, bell (or other signal) rings. A necessity in any confined place where combustible gases may be present.

Cat. No. DT-10060—
McDonald Standard Combustible Gas Alarm

Write for catalog section "SAFETY INSTRUMENTS" and prices

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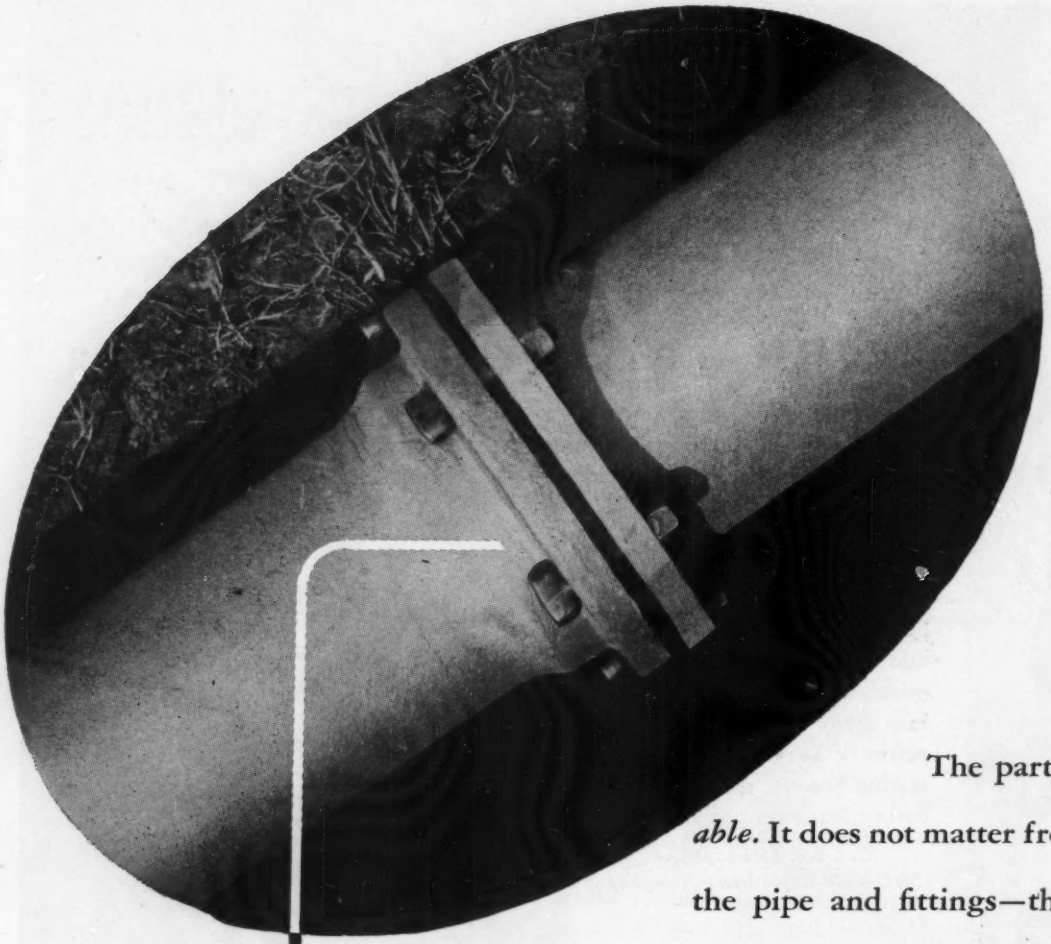


NOW

The parts are *interchangeable.* It does not matter from whom you buy the pipe and fittings—the glands, gaskets and bolts will be *interchangeable.* No longer any need to stock different parts—no longer

1 Paint socket, spigot and gasket with soapy water.

2 Slip gasket into position, making sure it is evenly seated in the socket.

THIS BOTTLE-TIGHT JOINT IS *Standardized*

any risk of delay on the job through delivery of wrong parts. The mechanical joint is now *standardized.*

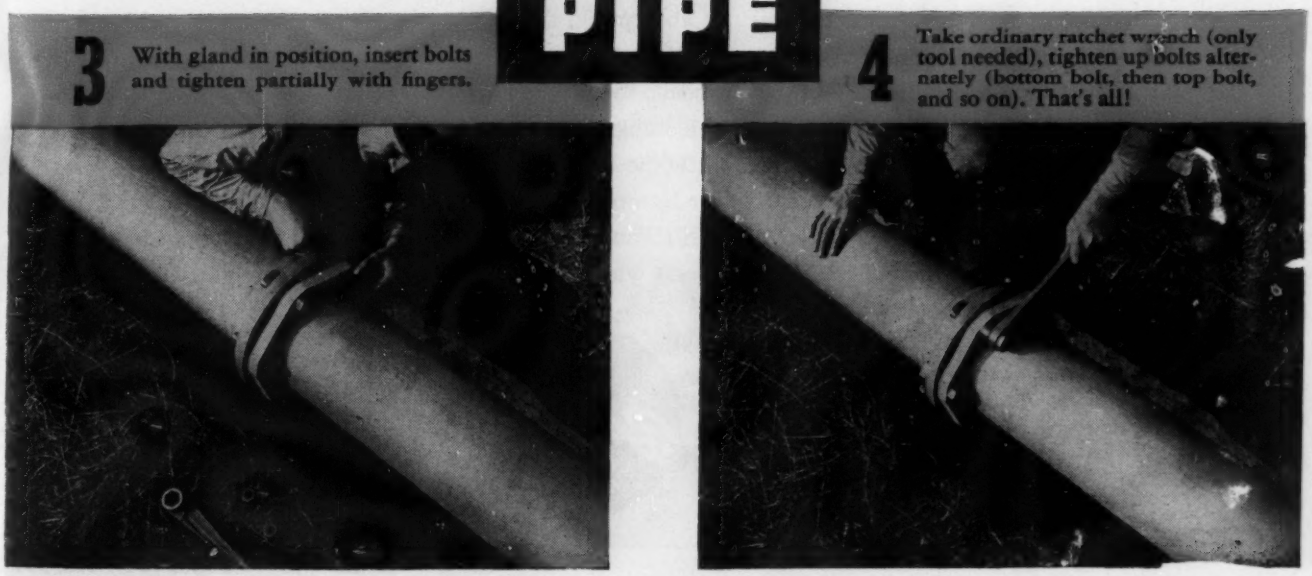
An eminent gas distribution engineer has said that there are three great chapters in the contribution of cast iron pipe founders to the gas industry. *First,* cast iron pipe itself, which made gas distribution in America possible; *second,* the development of the bottle-tight mechanical joint; *third,* the standardization of the mechanical joint.

All members of Cast Iron Pipe Research Association are now manufacturing the Standardized Mechanical Joint, with interchangeable parts, in sizes up to 12 inches. Larger sizes will be announced later. Cast Iron Pipe Research Assn., Thomas F. Wolfe, Research Engineer, Peoples Gas Bldg., Chicago 3, Illinois.

CAST IRON

***Standardized* MECHANICAL JOINT**

PIPE


3 With gland in position, insert bolts and tighten partially with fingers.
4 Take ordinary ratchet wrench (only tool needed), tighten up bolts alternately (bottom bolt, then top bolt, and so on). That's all!

The economics of cathodic protection demand a stable pipeline coating

When considering the installation of Cathodic Protection for pipelines, it is important to select a pipe protection whose underground electrical insulating properties are not affected by varying moisture content of the soil during changes in season, weather or by time itself. Obviously, the correct amount of electrical current cannot be varied continually to compensate for the fluctuations in current required.

Barrett *Coal-tar* Enamels possess this all-important *stability* of high dielectric strength. Because of their resistance to moisture absorption, they provide a constant, uniform and long-lasting stable insulation.

Coal-tar Enamels, applied by the modern mechanical methods now in use, and electrically inspected, assure the proper continuity of a stable insulation—and require less current and smaller capacity equipment to make Cathodic Protection economical.

The effectiveness of Barrett Coal-tar Enamels in preventing corrosion in conjunction with Cathodic Protection has been established through years of service in all types of soil and climatic conditions. A dependable guide to engineers when designing corrosion-proof pipelines.

FIELD SERVICE: The Barrett Pipeline Service Department and staff of Field Service men are equipped to provide both technical and on-the-job assistance in the use of Barrett Enamel.

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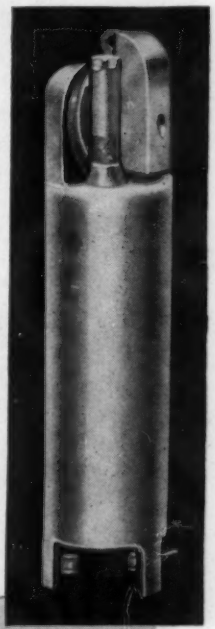
Wherever there are volatile or combustible products, in storage tanks, in refineries, or in pipe-lines, THERE is THE DEFINITE need for "VAREC" approved Tank Equipment, Gas Control and Safety Devices. "VAREC" Conservation Vent Valves with Flame Arresters are protecting volatiles from evaporation, product deterioration, and fire hazards, thus attaining maximum production. "VAREC" Gastight Automatic Tank Gauges with Built-in Gravity Compensator measure the tank contents to the highest degree of accuracy attainable. Many engineers specify "VAREC" Swing Line Equipment and Safety Devices as "STANDARD" where 100% efficiency and service are demanded.



IF IT'S "VAREC," IT'S PRE-FIELD TESTED.

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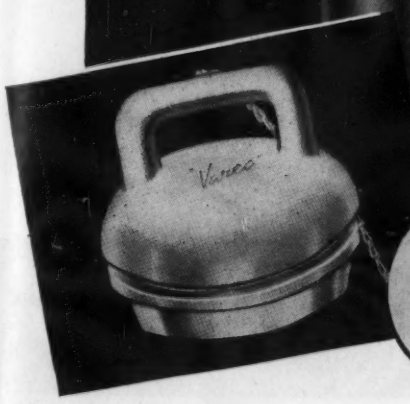
The Pace-Setter Since 1925



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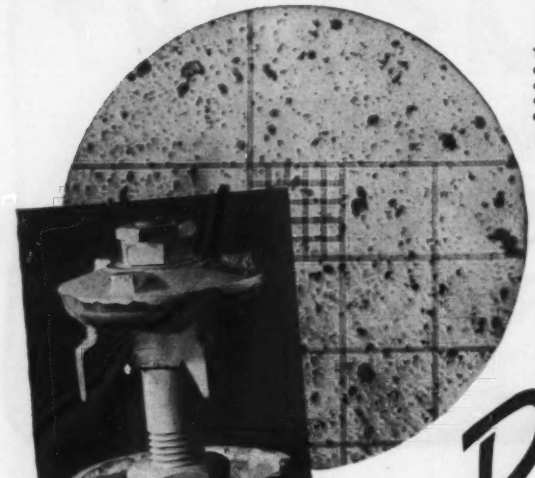


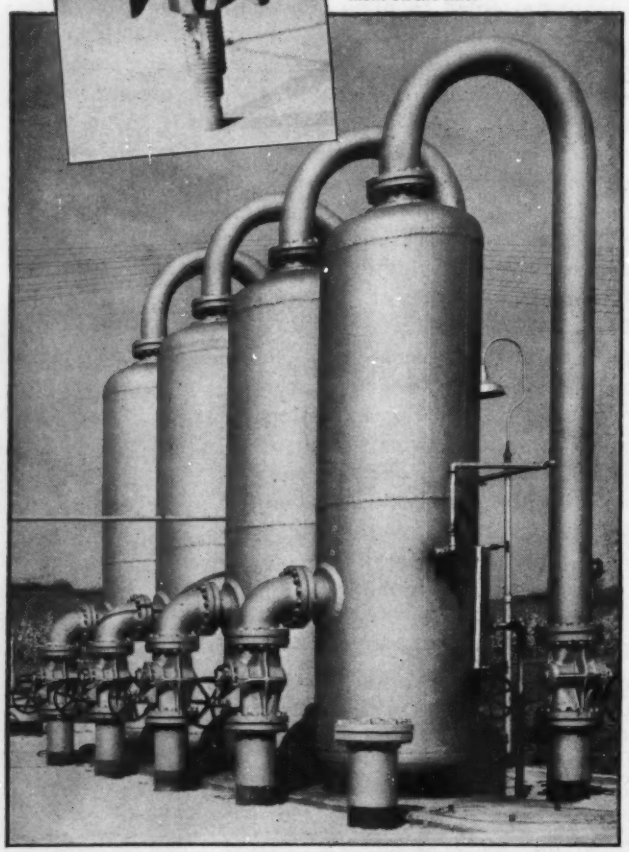
GAS MAIN DUST

The largest grains shown are less than 1-5000 of an inch across—easily carried long distances in a gas line.

REGULATOR VALVE

cut and eroded by gas main dust—typical of damage done to equipment on the line.

Don't Be Fooled by Their Size!



These Blaw-Knox Gas Cleaners in a large mid-western line show a very small overall pressure loss by actual instrument test.

The biggest grains of GAS MAIN DUST are insignificantly small and harmless looking even under a powerful microscope. Twenty-five million of them are un-crowded on a single square inch. But they have sharp edges and teeth that chisel their way through valves, meters and compressors, right into the pocketbook of the gas distributor.

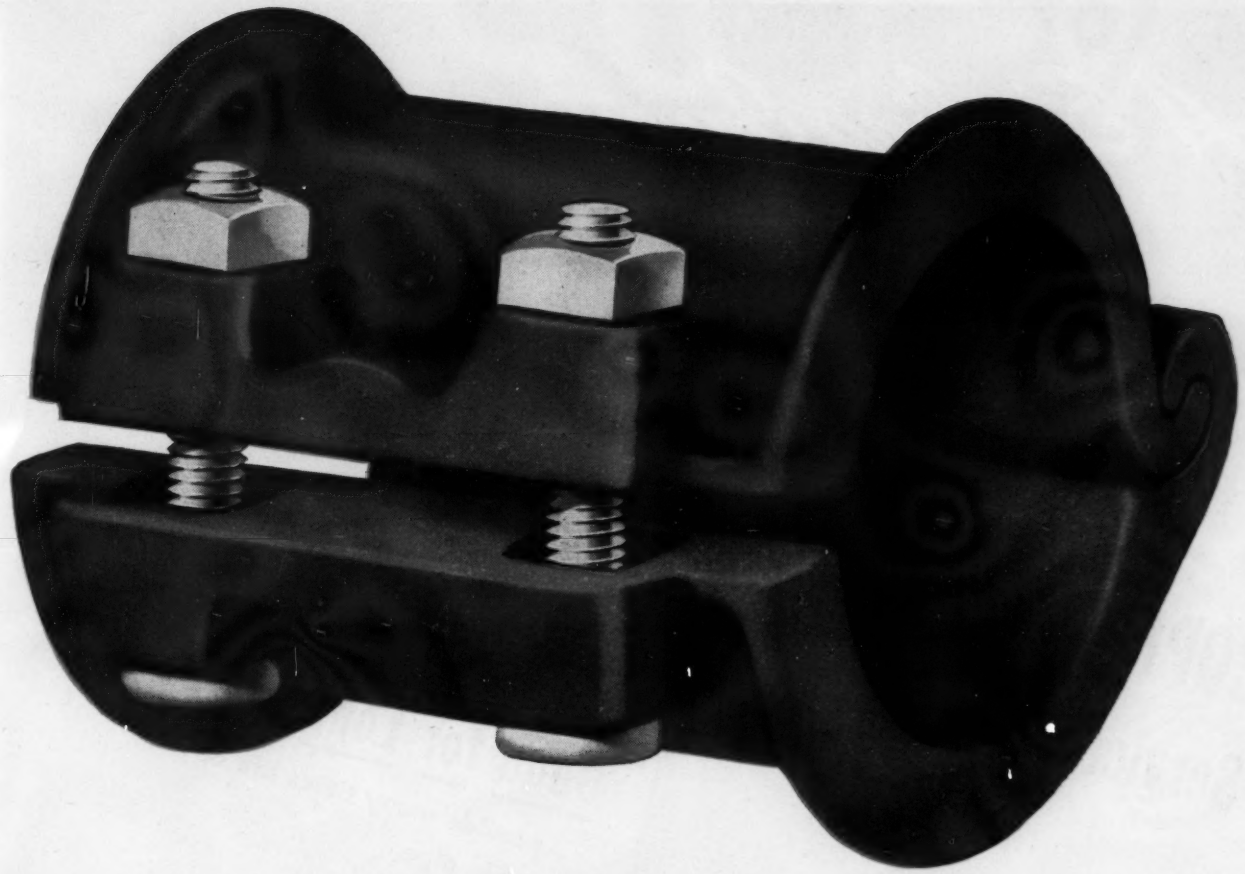
Clogged lines can be cured temporarily by blowing them out. But damaged valves, worn orifices, metering losses, poor regulation, excessive replacements and repairs, mounting service complaints and lost good will due to gas main dust can only be cured—permanently—by installation of Blaw-Knox Gas Cleaners at strategic points in the system.

Ask for Bulletin No. 1869

BLAW-KNOX DIVISION
OF THE BLAW-KNOX COMPANY
2033 Farmers Bank Building, Pittsburgh 22, Pa.

NEW YORK • CHICAGO • PHILADELPHIA • BIRMINGHAM • WASHINGTON

BLAW-KNOX GAS CLEANERS



EMERGENCY PIPE CLAMP

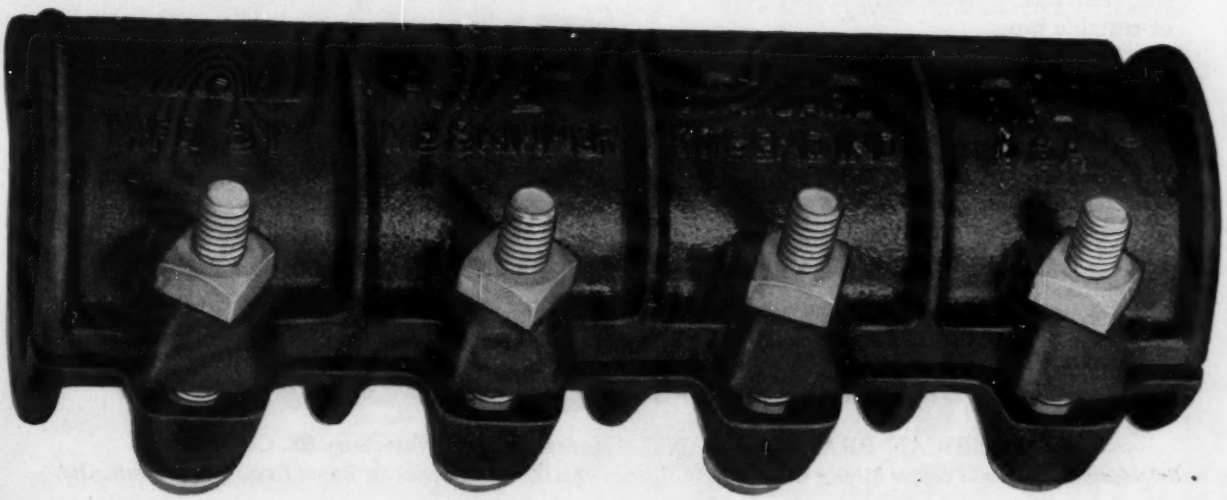
SKINNER-SEAL

PIPE LINE CLAMP

★ Two pipe repair clamps — in universal use for nearly half a century! Single length, SKINNER-SEAL Emergency Pipe Clamp — double length, SKINNER-SEAL Pipe Line Clamp.

Under present disturbed delivery situation — due to factors beyond our control — please place orders as far in advance as possible.

M. B. SKINNER COMPANY,
SOUTH BEND 21, INDIANA, U. S. A.



A Sterling Investment...

COPPER TUBES for Service Connections

Immediate Dividends
...in savings on installation costs

Steady Return
...in elimination of periodical inspection, repair and maintenance

Good for Long Pull
...provide many times life of rustable pipe

Safety of Principle
...stand up under the most severely corrosive soil conditions

COPPER TUBES in hard drawn lengths or annealed coils have been used as service renewals in recent years by several gas companies.

Because material cost is such a small proportion of the total . . . especially over a period of years . . . copper services are proving *more* economical than the original installations.

Copper tubes fed through existing lines eliminate or substantially reduce excavation costs, and, because of their high corrosion resistance, provide many times the life of rustable pipe.

Developments in the use of copper tubes for gas service lines have been closely followed by The American Brass Company. Gas distribution engineers are invited to write for information on the use of Anaconda Copper Tubes in such service.

4502

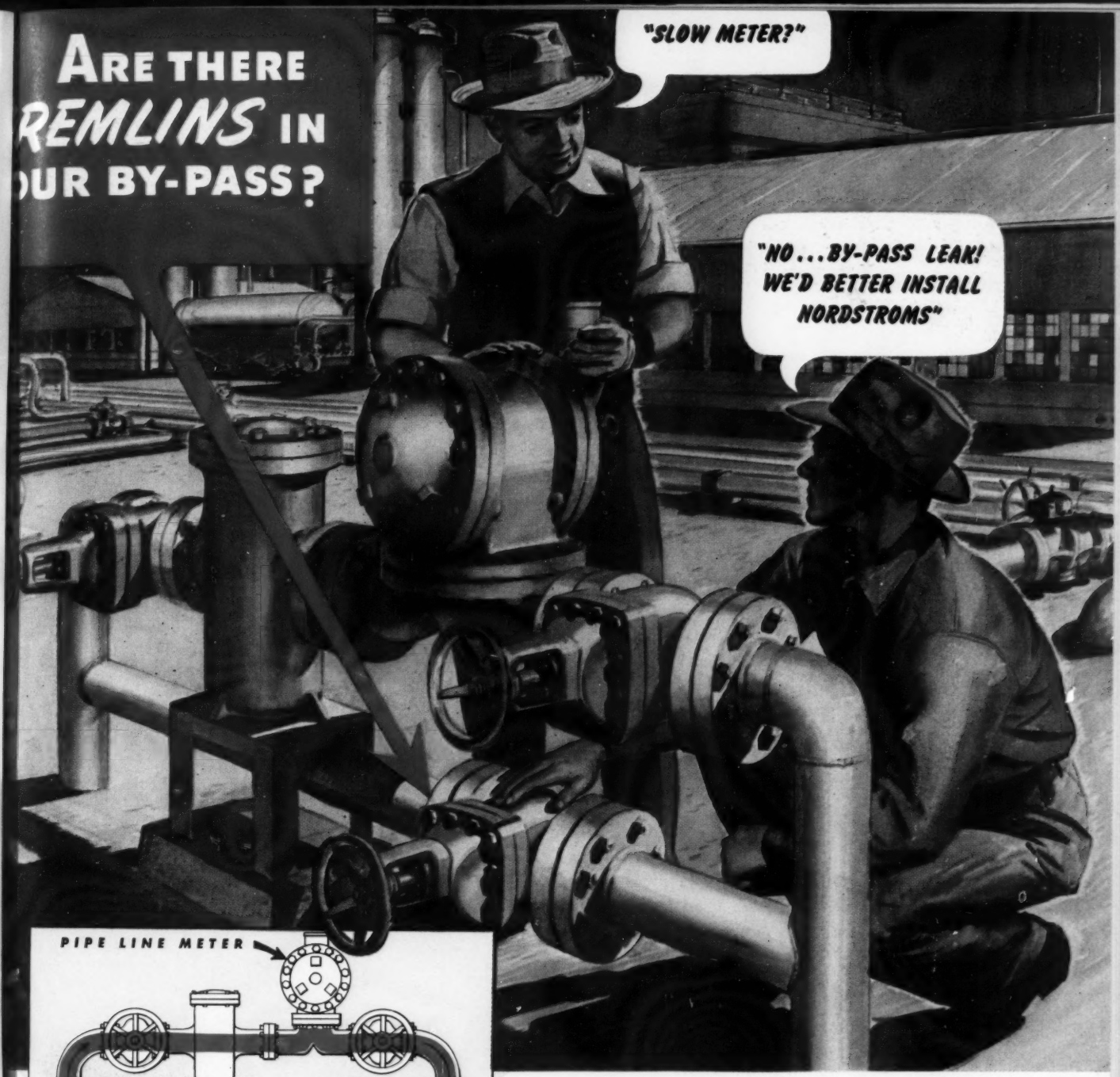
Buy Victory Bonds . . . Help assure World Peace

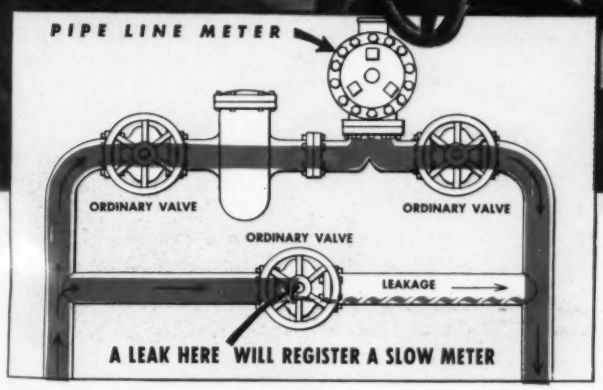
ANACONDA *Anaconda Copper Tubes*

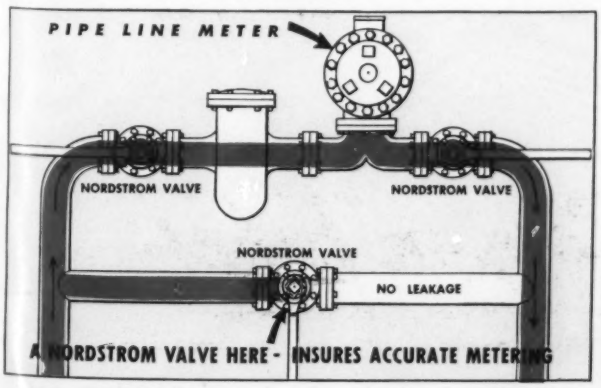
THE AMERICAN BRASS COMPANY—General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company • In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

ARE THERE *REMLINS* IN)UR BY-PASS?







LEAKY VALVES ON BY-PASSES CAUSE INACCURATE METERING

LEAKING gate valves on by-passes cause under-registration of the meter. This is especially true on pipe lines and at pipe line terminals using large oil meters. Losses can run as high as 5% to 10%. Unless the operator is aware of this leakage, the meter is usually blamed for inaccuracy. It isn't the meter's fault. A tight, leak-proof valve on the by-pass is absolutely necessary.

To assure complete satisfaction from any meter setting, use Nordstrom Valves on the by-pass. Not a drop of the line fluid (or gas) can pass a closed Nordstrom. If your meters are running slow, check your by-pass. *Change to Nordstroms.* Gas companies have learned by experience that Nordstrom Valves are essential on the by-pass. Many gas operators have made Nordstroms standard equipment for all meter settings.

NORDSTROM *Lubricated* **VALVES**

A valve principle, centuries-old, becomes indispensable in many plants

OLDEST of devices used by man for the control of fluids in closed conduits is the tapered plug valve. In the form of the common "stop-cock" it has been in general use since very early times, but only in the smaller sizes and for moderate services.

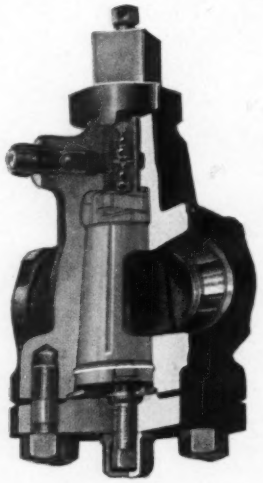
It was not until the advent of the Nordstrom pressure-lubrication principle (1916) that the plug valve became available for the full range of heavy-duty process and industrial uses. Since that time, this principle has been built into Nordstrom Valves of many sizes, styles and materials to meet the demands of practically every branch of the piping industry.

FUNCTIONS OF VALVE LUBRICATION

The functions of pressure lubrication in Nordstrom Valves are: (1) *Hydraulic action,* keeping the plug in free working condition; (2) *Maintenance of positive seal* against internal and external leakage; (3) *Free turning,* even of the largest sizes and against heavy differential pressure; (4) *Protection of working surfaces* from wear and corrosion. Thus, the Nordstrom principle of lubrication has made it possible to take full advantage of the inherent simplicity, compactness and positive rotary action of the tapered plug valves.

LUBRICATION IS VITAL

Lubrication of a tapered axle skein is necessary for easy rotation and long life of the metal contacting surfaces. Lubrication is even more important in a valve. For extra long life lubrication must be used.



Hypreseal Type

TAPERED PLUG

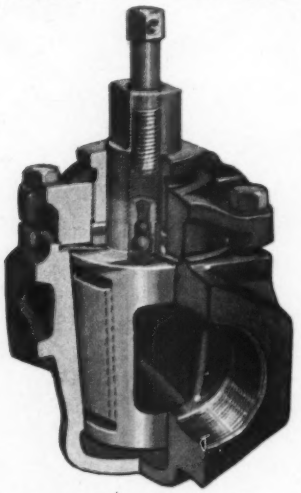
The tapered form of plug and seat provides an intimate fit, regardless of the thickness of lubricant film. Even with a complete absence of lubricant, the plug and body have a ground-joint, metal-to-metal contact. The positive rotary action of the tapered plug valve provides inherent protection of the seating surfaces against corrosion, erosion or accumulation of solids.

LUBRICANT "JACKING"

In all Nordstrom Valves, lubricant forced in under pressure produces a momentary lifting movement of the plug, which overcomes any adhesion and, because of the taper, creates a small space for a lubricant film between the plug and body.

RESILIENT SEATING

In every type of Nordstrom Valve, the arrangement which holds the plug in place has a small, but highly important, degree of resiliency. This prevents binding and allows the lubricant "jacking" action to function properly.



Regular Screwed Gland Type

"SEALDPORT"

In the Nordstrom patented *"Sealdport"* system, the grooves are divided between the body and plug in such manner that the exposed groove sections are disconnected from the lubricant supply before they are brought in contact with the line-fluid space. These grooves are automatically reconnected when the plug is brought to the fully open or closed position. Ports are completely surrounded by a lubricant film, preventing leakage past any part of the port boundary.

Nordstrom LUBRICATED VALVES

Sealdport Lubrication

MERCO NORDSTROM VALVE COMPANY — *A Subsidiary of Pittsburgh Equitable Meter Company*

Main Offices: 400 Lexington Avenue, Pittsburgh 8, Penna. • *Branches:* Atlanta, Boston, Brooklyn, Buffalo, Chicago, Columbia, Houston, Kansas City, Los Angeles, New York City, Oakland, San Francisco, Seattle, Tulsa • *Canadian Licensees:* Peacock Bros., Ltd., Montreal

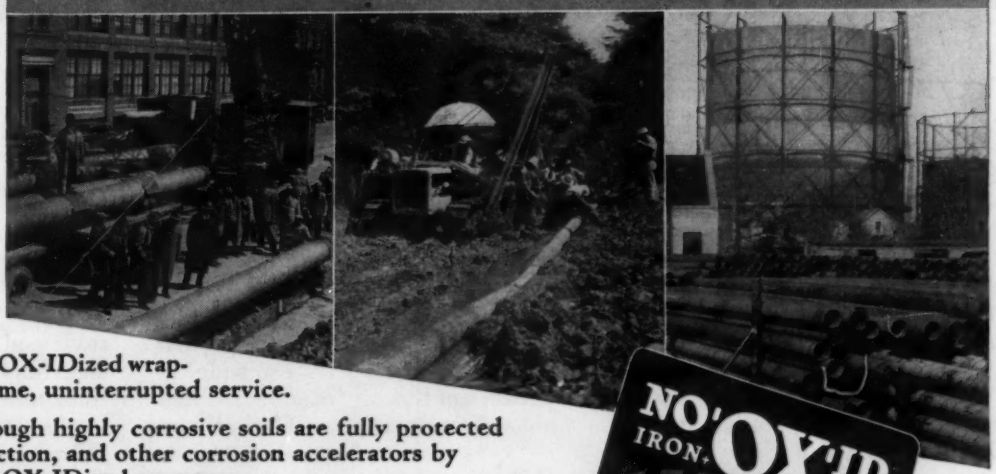
European Licensees: Audley Engineering Co., Ltd., Newport, Shropshire, England • *South American Representative:* The Armco Int'l Corp. • *Main Office:* Middletown, O

PRODUCTS: Nordstrom Lubricated Valves; Air, Curb and Meter Cocks • Nordco Valve Lubricants • EMCO Gas Meters • EMCO-McGaughy Integrators • EMCO Regulators • Pittsburgh-National Meters for Gasoline, Grease, Oil, Water and other Liquids • Stupakoff Bottom Hole Gauges

This "wedding" must be prevented

When iron (Fe) casts its lot with oxygen (O_2) to form the union which breeds corrosion on metals, the condition illustrated above occurs. Structures suffer loss of metal, and excessive pitting may result in weakness requiring total replacement. Corrosion due to the unhappy union of iron with oxygen *must* be stopped.

.....AND NO-OX-ID IS THE GREAT "PREVENTER" OF IRON AND OXYGEN GETTING TOGETHER



1 Service lines under city streets or paved areas need to be protected with NO-OX-ID and NO-OX-IDized wrappers to insure long-time, uninterrupted service.

2 Pipe lines laid through highly corrosive soils are fully protected from moisture, soil action, and other corrosion accelerators by NO-OX-ID and NO-OX-IDized wrappers.

3 Gas holders last longer when NO-OX-ID protected.

NO-OX-ID and NO-OX-IDized wrappers can be applied by stationary or traveling equipment.

NO-OX-ID IRON RUST
REG. TRADEMARK AUG 27, 1918

The ORIGINAL RUST PREVENTIVE

Dearborn Chemical Company
Dept. B, 310 S. Michigan Ave., Chicago 4, Ill.
New York • Los Angeles • Toronto

A SECTION of NATIONAL Seamless being laid on Southern Counties' high-pressure line from the oil fields west of Santa Barbara into Ventura, California.

WHEN you're ready to go ahead —and you're hurrying to get those new extensions down, NATIONAL Seamless Pipe will prove a real time and money saver. For, in addition to its recognized advantages of high tensile strength and high degree of ductility, this famous "Walls Without Welds" pipe comes in long lengths and reduces the number of joints per mile—you can lay more line per day.

But, NATIONAL Seamless pays its big dividends after you get it down. Then is when you begin to appreciate the long-lasting qualities of this superior pipe. The shatterproof properties of the steel, the fact that it is seamless, eliminating any possibility of longitudinal weld leakage, and that any type of sound, leakproof joint can be used—these advantages offer the basis of the best possible assurance of long, uninterrupted, profitable service.

NATIONAL Seamless is made by the largest manufacturer of tubular products in the world. The wide experience of this organization is available on any gas line problem involving sizes up to and including 24-inch O.D. Your plans for future extensions or entirely new lines will be reviewed and competent advice cheerfully given without any obligation. Join the many users who have learned from long experience that "You Can't Go Wrong With Seamless." Descriptive literature will be sent upon request.

NATIONAL TUBE COMPANY
PITTSBURGH, PA.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

UNITED STATES STEEL

Investigate

Phillips
BUTANE
PROPANE

Gas utilities profit by the use of Phillips Propane or Butane because of their low cost and ease of utilization. Shipped and stored in liquefied form, they have all the advantages of liquids but are easily converted to gaseous form and thus utilized. Low cost is only one of the several sound reasons why more and more gas utilities are using these ideal gases for:

1. **Converting coal gas and water gas plants to economical propane-air**
2. **New propane-air gas plants in small towns**
3. **Enriching or augmenting the gas supply**
4. **Peak-shaving with elimination of demand charges**
5. **Underfiring of coke ovens**

Why not contact our nearest District Office and invite a Phillips engineer to furnish details of the particular phase which interests you?

PHILLIPS PETROLEUM COMPANY

Philgas Division

BARTLESVILLE, OKLAHOMA

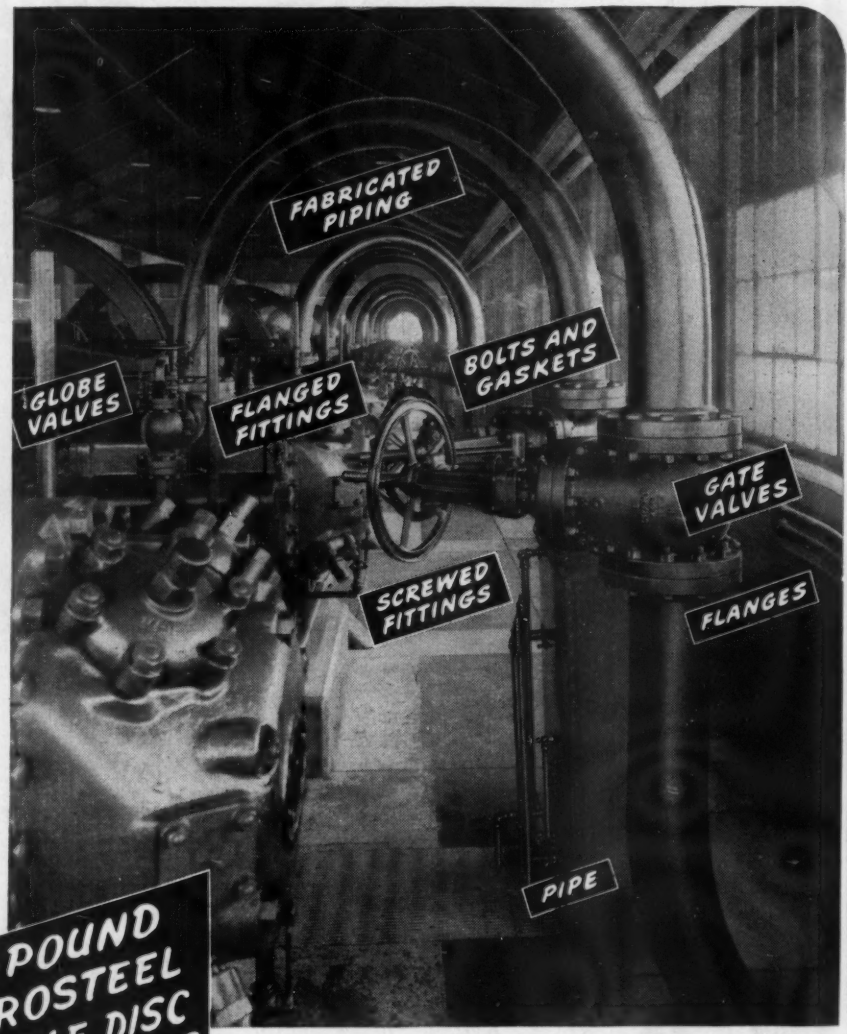
Branch Offices in NEW YORK, CHICAGO, PHILADELPHIA, MILWAUKEE, DETROIT, ST. LOUIS, SHREVEPORT, AMARILLO, HIBBING, DENVER

THE WORLD'S LARGEST MARKETER OF LIQUEFIED PETROLEUM GAS

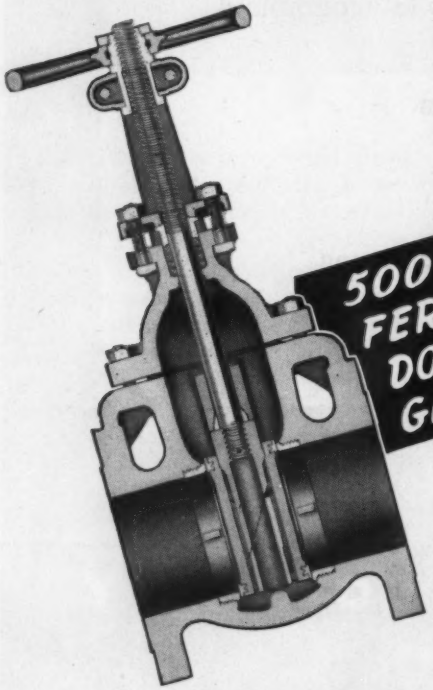
CRANE... your natural choice for gas piping materials

ONE SOURCE OF SUPPLY • ONE RESPONSIBILITY • ONE STANDARD OF QUALITY

• Look to the Crane line—when you need piping materials—for gas or any other service. One source—your Crane Branch or Wholesaler—supplies on one order all your requirements for any job. You choose from the world's greatest selection in brass, iron and steel equipment. Uniform quality in all materials—backed by single responsibility—helps assure the best installations; keeps them at peak efficiency. Use this complete service to speed deferred replacement work while you get the benefit of Crane Co.'s 90-year experience in piping materials. Below is one example of how the Crane line simplifies your valve requirements.



Natural Gas booster station



500-POUND FERROSTEEL DOUBLE DISC GATE VALVES

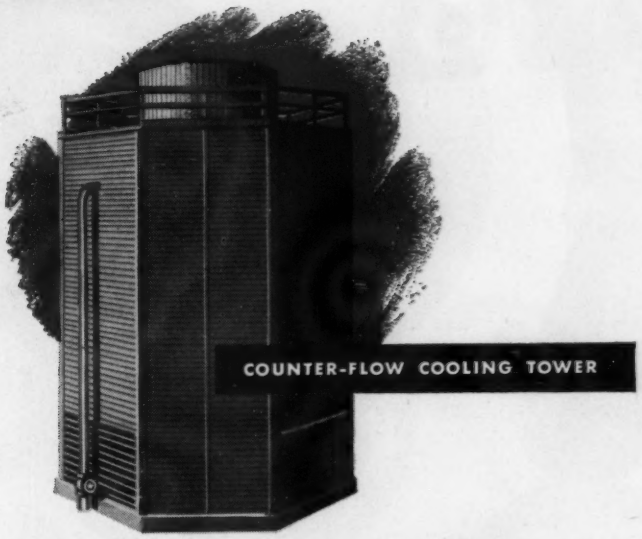
SERVICE RECOMMENDATIONS:

Rated at 500 pounds, water, oil, or gas, these Brass trimmed **Crane Ferrosteel Double Disc Gate Valves** are suited for a wide variety of gas services requiring heavy, massive valves—in gas fields, pipe lines, pump houses, etc. Outside screw and yoke pattern illustrated, with flanged ends, also non-rising stem pattern with screwed or flanged ends, in sizes up to 24 in. For complete specifications, see your Crane Catalog.

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. • *Branches and Wholesalers Serving All Industrial Areas*

CRANE 90 YEARS OF PROGRESS 1855 1945 **VALVES • FITTINGS • PIPE • PLUMBING • HEATING • PUMPS**

AERATOR COOLING TOWER



COUNTER-FLOW COOLING TOWER

WHAT IS YOUR COOLING PROBLEM?

FIN-FAN COOLING UNIT

FLUOR doesn't try to fit just one type of Cooling Unit to all cooling requirements. There isn't any cure-all. Years of field experience on all kinds of cooling problems proves that three basic types are necessary to meet widely different conditions... and Fluor builds all three.

1. The FLUOR atmospheric type *Aerator* Cooling Tower for installations where ground space is not a consideration..... and where prevailing wind conditions are suitable. 2. The FLUOR mechanical draft type *Counter-Flow* Cooling Tower for installation where ground space is limited and a more constant cold water temperature is required. 3. The FLUOR *Fin-Fan* Cooling Unit for installation where water is scarce or expensive and bottom temperatures desired are not approximately atmospheric temperature. FLUOR recommendations are based upon the correct unit for the specific conditions and requirements, backed by extensive field tests and broad engineering experience on all three types of Cooling Units.

Patents and Patents Pending

FLUOR

ENGINEERS • MANUFACTURERS • CONSTRUCTORS

PROCESS PLANTS AND EQUIPMENT FOR THE OIL, GAS AND ALLIED INDUSTRIES

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CURVES with straight pipe Save Time on the job

Many Field Bends and "Specials" Eliminated with Dressers

Because Dresser Couplings permit approximately 4 degrees of deflection from pipe section to pipe section (from 10° for small diameter pipe to ½° for very large diameter pipe), it is possible to build moderate curves in a pipeline without resorting to pipe bending in the field.

Obstacles such as rock strata, buildings, poles and ground elevations need not delay pipeline construction. Special surveys, to avoid trouble at these points, are unnecessary.

None of the other Dresser advantages are sacrificed in building a curve in this manner. Dresser Couplings can be installed with the same speed, and assurance of no leakage, that is possible with straight-line building. No skilled workmen are required for any Dresser Coupling installation.

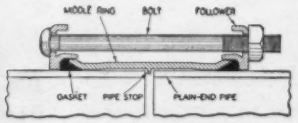
From 65 years of experience with all types of pipelines, Dresser has accumulated one of the most complete sets of pipeline data in the world . . . to help you build pipelines. Send us your inquiry on any pipe joining problem.

★ ★ ★

DRESSER MANUFACTURING DIVISION
Bradford, Pennsylvania
In Texas: 1121 Rothwell St., Sec. 16, Houston, Texas.
In Canada: Dresser Manufacturing Co., Ltd., 60 Front Street, West, Toronto, Ontario.

DRESSER COUPLINGS for maximum joint flexibility

Style 38



Cross Section

Dresser Couplings are simply installed . . . and easily salvaged for new lines. Two resilient gaskets held in compression, grip pipe tightly . . . but also permit considerable latitude in pipe deflection to permit building curved pipelines. This flexibility also permits expansion and contraction of pipe sections without setting up harmful stresses . . . the key to the decades of service with practically no maintenance so characteristic of Dresser-coupled pipelines.

DRESSER COUPLINGS
ONE OF THE DRESSER INDUSTRIES for Plain-End Pipe

It's not true!

Peas in a pod are NOT alike. All of nature's products show sharp variations in form, structure and quality.

VULCAN regulator and meter diaphragms are not subject to the erratic whims of nature. They are scientifically **manufactured** . . . of laboratory-controlled composition. They afford absolute uniformity of thickness. They need no sorting, inspecting or grading. They are MOLDED to desired shapes.

VULCAN diaphragms have no weak spots to wear. They don't dry out and crack, because they contain no oil. Yet they remain soft and flexible. There is no dimensional change.

For these, and many other reasons, the trend is to VULCANS to safeguard meter and regulator accuracy.

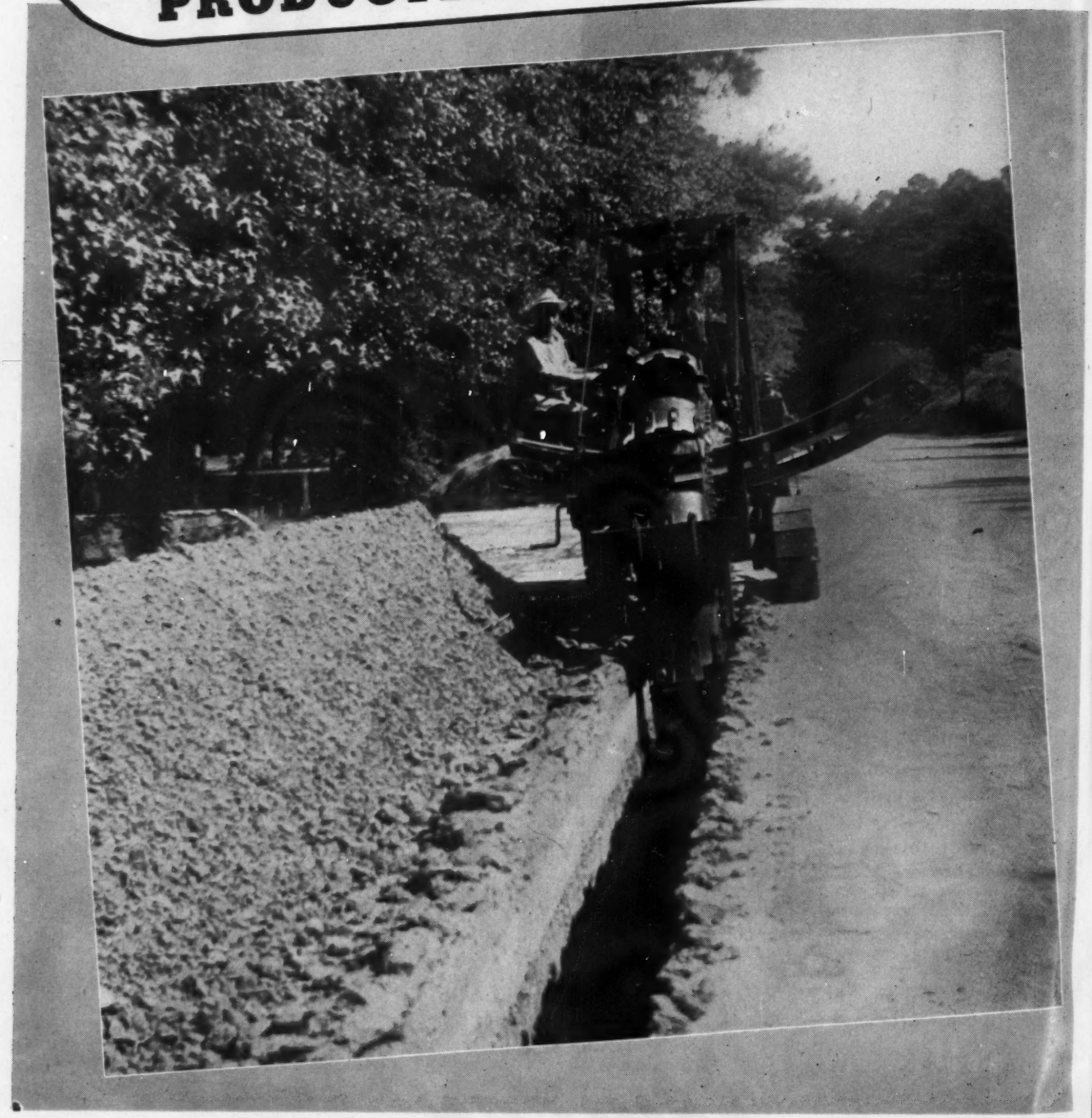
VULCAN

PROOFING COMPANY

FIRST AVENUE AND FIFTY-EIGHTH STREET, BROOKLYN 20, N. Y.

CLEVELANDS-

for DEPENDABLE TRENCHING PRODUCTION . . .



THE CLEVELAND TRENCHER COMPANY

20100 ST. CLAIR AVE. • CLEVELAND 17, OHIO

"CLEVELANDS" Save More . . . Because They Do More

A Message to our Customers

PRODUCTION! With VJ-Day culminating the War, the Sprague Meter Company, like all other suppliers of the Gas Industry, look forward to the day when restrictions will be a thing of the past and we can move forward to unprecedented production.

SERVICE! Sprague has been noted for its service, and in spite of tremendous demands placed upon the Company during the War, we continued to give the same high quality of service as promptly as could be effected under prevailing conditions.

NO SUBSTITUTES! During the War no substitute materials were used in any part of the meter. This means that standard parts have been used throughout the War and will continue to be used in Spragues.

APPRECIATION! Your cooperation and patience has been greatly appreciated. We have done the best we possibly could, and it will be a pleasure to continue to serve you to the fullest extent of our ability.

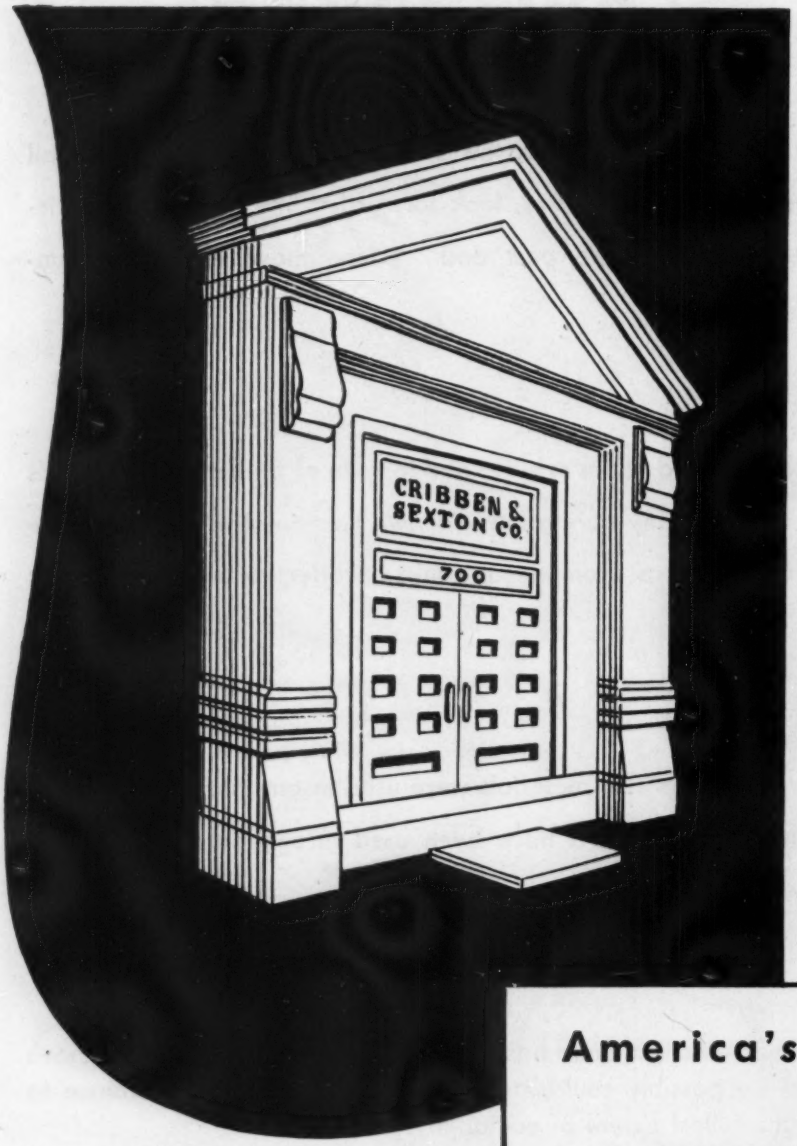
F. C. Fairchild.

President and General Manager

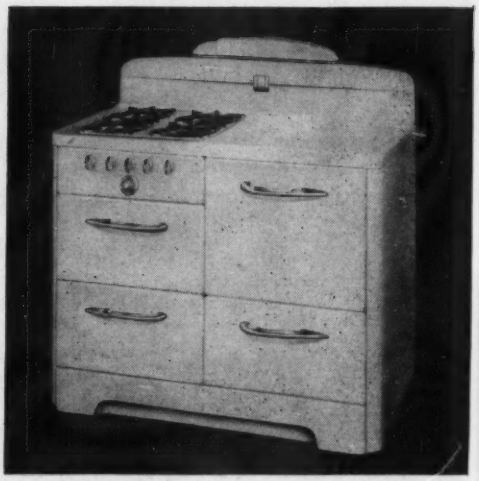
The **SPRAGUE METER COMPANY**
Bridgeport, Connecticut

An Address

that's more than seventy years old . . .



is a good guarantee that . . .



UNIVERSAL *GAS* RANGES have earned the right to be

America's Preferred Cooking Choice!

Accumulated years of experience . . . plant facilities of adequate capacity . . . . . management ability with foresight—these things, plus a selective selling policy supported by sound sales promotion are the foundation of UNIVERSAL'S reconversion program and a guarantee toward its accomplishment.

CRIBBEN & SEXTON CO.
700 North Sacramento Boulevard
Chicago 12, Illinois
UNIVERSAL *GAS* RANGES

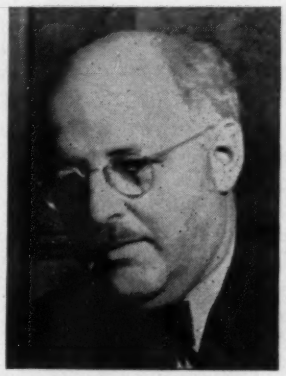
THERMALLY THINKING

By ELLIOTT TAYLOR, Washington Editor

Hasty Disposal

IT IS currently reported that the surplus property board is prepared to recommend to congress that the war emergency twenty-four-inch and twenty-inch oil pipelines be retired from operation, filled with water and placed in "strategic reserve"—whatever that may mean.

Such a recommendation on the part of the board strikes us as extremely precipitous in view of the fact that some preliminary studies have already been made of the feasibility of converting these lines to natural gas carriers to serve the markets along the Atlantic seaboard that have long been clamoring for natural gas.



Elliott Taylor

It will be recalled that the proposed Reserve pipeline, which was under consideration before the war, contemplated serving gas in the same general areas that could be handled by the so called big and little inch lines. Market studies and estimates of probable consumption made at that time indicated that the project was practical, and it seems only reasonable to assume that such studies, if brought up-to-date, would show as favorable at outlet for gas, if not indeed a more promising prospect.

We are aware that the petroleum industry is anxious to have the two lines out of operation as oil carriers. We also assume that the professional natural gas obstructionists in coal and railway circles have been working to have them eliminated as possible natural gas lines.

But whether the salvage value of these two great projects, one costing the government $113 million and the other $78 million should be lost in its entirety just to placate the coal industry, and without even an investigation of their practicability in natural gas service, is open to considerable question.

It may be within the province of the surplus property board to clear the lines and fill them with water or with molasses or any other substance that suits its whim. But it does not seem to be in the best interest of the national economy for the board to seek congressional approval of a policy that is obviously and primarily designed to forestall any attempt on the part of natural gas operators to convert one or both of the carriers to the transmission of natural gas.

An Inconclusive Investigation

THE first heat of the Federal Power Commission's pursuit of the truth regarding natural gas and the natural gas industry seems to have come to a more-or-less inconclusive finish with the termination of seven days of hearings in Kansas City on Sept. 26. Whether any new and hitherto unrecorded facts of life in the fuel industries were recorded by the examiners we have no way of knowing, because we have never had any way of knowing what facts the Federal Power Commission keeps on file and draws on for its decisions.

But we do know this—all of the ancient prejudices and their prophets, all of the chronic and professional natural gas obstructionists with their array of pseudo-economic arguments, and all of the dissention within the industry, itself, was brought to the fore and subtly encouraged to present cases that, taken in their entirety, will amount to a revelation of a regrettable lack of unity in respect to matters affecting natural gas.

There seems little doubt about it that this, the first of four traveling traducements of natural gas, came off with the Federal Power Commission away out ahead in public opinion and deservedly so. The Commission has succeeded in setting itself up as judge and jury, hearing and weighing evidence, the great preponderance of which is, within any reasonable conception of the natural gas act under which it operates, entirely outside the pale of Commission jurisdiction.

It has succeeded in nodding sympathetically to those cities and states that know they must import natural gas if their industrial and commercial life is to continue, the while it has coyly cottoned to the unconstitutional aspirations of producing states who would, if they could, keep gas embargoed within their own borders.

The opening statement of Commissioner Nelson Smith was a masterpiece of soft cajolery, a dignified disclaimer of any ambition that the Commission may have been accused of entertaining to take over control of the production of natural gas and oil. He did not answer, nor has anyone yet been able to answer, how the end uses of gas can be controlled, prescribed or prohibited without the effects of those controls being instantly and permanently manifest in the production of all natural gas, and the production of oil in any area where it appears with appreciable quantities of natural gas.

The Commissioner also touched with due filial respect on the obligation that the FPC has under the natural gas act to keep the Congress informed of conditions within the industry, and to make "such recommendations as may appear to be appropriate and necessary." He caressingly lingered over the implications of Section 11-B of the act, which "makes it the duty of the Commission to assemble and keep current pertinent information relative to the effect and operation of any interstate compacts dealing with the conservation, production, transportation or distribution of natural gas, and to report to the Congress from time to time the information thus obtained . . ." He referred eagerly to Section 14-A of the act which "still more broadly . . . empowers the Commission to investigate any facts, conditions, practices or matters which it may find necessary or proper in order to aid in the enforcement of provisions of the act, or to obtain information to serve as a basis for recommendations to Congress."

Section 7-F of the same law, however, was conveniently ignored by the Commissioner, just as it has been conveniently ignored by the entire Commission since it was first promulgated. Section 7-F authorizes the Commission to define service areas within which natural gas companies may enlarge or expand their facilities "for the purpose of supplying increased market demands in such service area(s) without further authorization."

In his plea for cooperation to the end that the greatest benefits may accrue to all, Commissioner Smith was apparently sincere: "As we (the Commissioners) see it, this investigation provides us all with a needed opportunity to sit down together in a cooperative spirit to explore our common problems."

We are well aware that some natural gas industry executives have been brought around to this way of thinking. They are prepared to lay as voluntary votives upon the altar of bureaucratic ambition all of the intimate details of industry operation that should be elicited only by subpoena. We regard this not as cooperation toward the end of the common good, but rather as unwitting participation in proceedings that are aimed at their own undoing. And although the hearings are not regarded as adversary proceedings, no unprejudiced observer could read the badgering cross examination of Kansas Commission Chairman Richard B. McEntire by lawyer Tom McGrath, of the coal and railroad interests, without regarding him as an adversary.

Some of the industry's own chickens came home to roost in the closing sessions of the Kansas City meetings, when witnesses reflecting the views of many independent oil and gas producers, vigorously denounced the practices of the major pipeline companies taking gas out of Hugoton field. Asserting that a virtual monopoly exists under which the small producers are deliberately denied a profitable market for their gas, one producer asserted that his own company had been able to sell gas from only three of the twenty-nine wells that it had drilled in the Hugoton field, and that of his open flow capacity of 259 million cu. ft. of gas per day, only 1½ million is sold.

It becomes increasingly obvious that open and aboveboard dealing between pipeline companies and all gas producers, with gas selling at a fair price at the well head, or delivered into the transmission mains, represents the only avenue of accord along which the industry can hope to proceed in unified opposition to restrictive Federal regulation.

Testimony already gathered indicates that the producing states, as well as the private producers within the states, are primarily concerned with this major problem of price. The chimera of industrializing the desert and and attracting some of the new and fanciful plastic industries to producing states in search of cheap gas fuel is occasionally viewed with longing by every state having any appreciable quantity of gas.

But realistic common sense recognizes that it is a decent return for the gas that is primarily sought after. If that can be had through continuing to sell into long distance transmission lines, the objections from the producing areas will be few and inconsequential.

System Needed

Explanations and recourse to a supportable legal position notwithstanding, we believe that a system must be speedily devised whereby every producer having gas within an area economically proximate to gathering lines will be assured of an opportunity to deliver the maximum marketable amount of its gas into those lines.

Let such a practice come into vogue and universally prevail throughout the gas producing areas and the clamor for the restriction of end uses to commercial and domestic load would find no support from that quarter. Then and only then the interests of the gas consuming areas and those of producing states will tend to become identical, and the case for greater Federal control will once more be forced to rest only on the political ambitions of its proponents.

Dr. E. DeGolyer's testimony on natural gas reserves, which was substantially the same as that which he had previously delivered to the O'Mahoney committee and before the Interstate Oil Compact Commission, was repeated in Kansas City for the purpose of the record. DeGolyer, more than any one person, has provided the scientific and factual disclaimer of the contention that our gas resources are in imminent peril of exhaustion. Apparently even the FPC is willing to accept his figures as authentic.

There will be continuations of the hearings in Oklahoma City, in New Orleans and in Dallas, with the summing up of the whole to be conducted in Washington at some presently undisclosed date. Whether the forthcoming hearings will develop anything more fundamental to the problem than a restatement of the self-interest of the various parties, such as was heard at Kansas City, is doubtful.

By now the FPC must know what is obvious to everyone; that the producing states want to sell gas without let or hindrance if they can get a decent price for it; that areas having no natural gas want it introduced at the earliest possible moment; that gas cannot be taken from producing areas and sold into consuming areas at a fair price unless the maximum amount of flexibility is permitted in adjusting terminal consumption to pipeline capacities; and that no matter how long the discussions are continued, nothing short of capping all the wells and plugging the transmission lines will ever satisfy the coal lobby.

In the meantime, and in our opinion, the best thing that the gas pipeline companies can do in their own behalf, and for the common industry cause, is to seek a way to end the differences that exist between them and the producers, to the end that an united rather than a divided front may be presented to all who would discredit, deflect or dam the continued advance of the natural gas industry.

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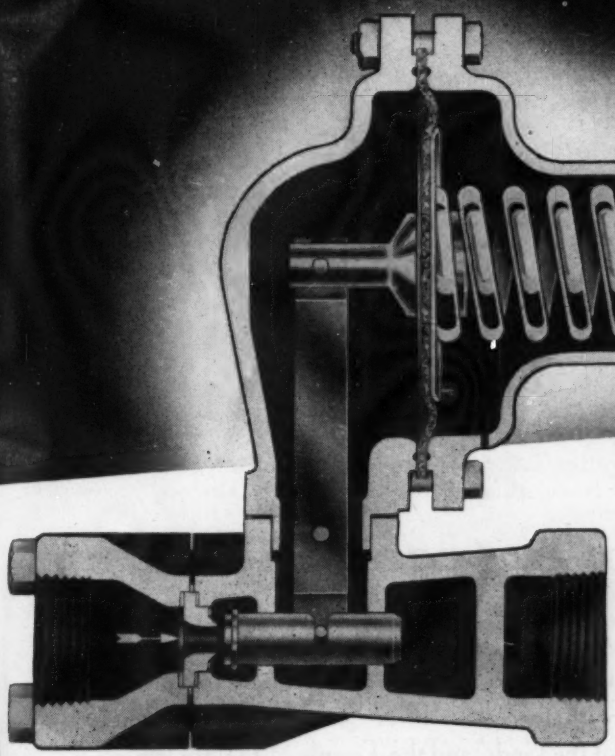
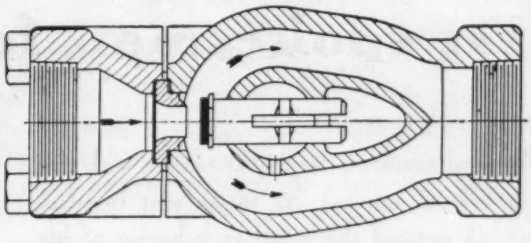


Horizontal sectional view through body.



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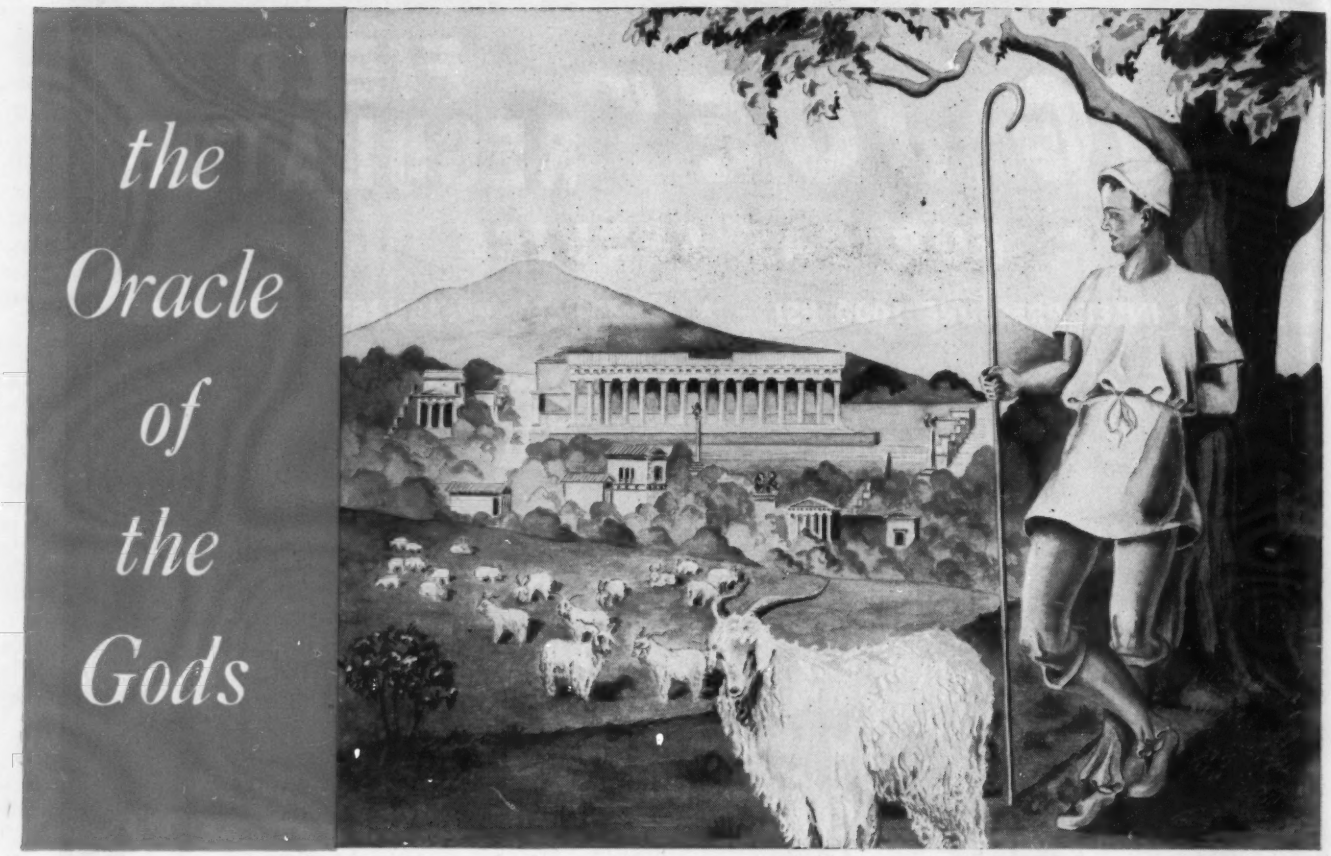

First spokesman for a great industry

Legend credits a boy goat-tender with the discovery of natural gas in ancient Greece. This lad noticed the peculiar behavior of his animals whenever they came near a certain spot. Investigating villagers became giddy and affected by something that arose from the ground.

In those days, the Greeks considered the weak-minded as special favorites of their gods. They treated such unfortunates reverently. The seeping gas made the villagers light-headed and talkative. They concluded that a god must live at this place. They built a temple and appointed a priestess to converse with this god. Thus "gas became the Oracle of the Gods" and the Temple of Delphi famous.

Today, gas as a fuel speaks for itself—in convenience, cleanliness, and economy. Working in close cooperation with gas distribution engineers, EMCO Meter and Regulator developments have for many years helped further the advance of this industry.

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Highlights

• Estimated production of gas ranges by June, 1946 will total 220,00 per month, well above the prewar (1940-41) monthly rate of 165,000, according to a September statement of WPB.

• A group of underwriters, organized and headed by Stone & Webster, have purchased all of the stock owned by the Chicago Corp. in Tennessee Gas and Transmission Co., which operates a 1200-mile, 24-in. line between Corpus Christi, Texas and Charleston, West Virginia.

• It's the gas range—22-to-1—in a survey made by the A.G.A. among 141 utilities representing about one-half of the country's 20,000,000 meters.

• A.G.A. statistics show that as of March, 1945, 3.5% of the 10.5 million homes served with manufactured or mixed gas use gas as a heating fuel. In natural gas areas, the saturation point is much higher. Sights for house heating saturation have been set at at least 25% of the present 20.3 million users of gas and of new homes to be built.

• Nashville, Tenn. may have natural gas by next winter if plans of Nashville Gas and Heating Co. materialize. Tennessee Gas and Transmission Corp., which has applied to FPC for permission to increase capacity from 204 to 263 MMcf. per day, would supply the gas.

• Second quarter revenues for the industry were up 4.4% or $280.6 million over the $268.8 million a year ago. Customers on June 30 totaled 19,838,400, up 2.2% over last year's June 30 figure of 19,419,000.

• To provide the people of Southern Wisconsin with an assured supply of natural gas the FPC on Sept. 18 directed Natural Gas Pipeline Company of America to extend its pipeline facilities to the Illinois-Wisconsin State line to connect with a line to be built by Wisconsin Southern Gas Co. This brings to an end the long struggle to prevent the entrance of natural gas into Wisconsin.

• The idea of selling the "Big" and "Little" inch oil lines for conversion to gas has apparently been given up. Congress will be asked to approve a plan to clear the lines, fill them with water, and retire them from operation as a "strategic reserve."

• Chairman Basil Manly of the Federal Power Commission has resigned to accept the presidency of Atlanta Gas Light Co., a post vacated when H. Carl Wolf became managing director of A.G.A. Harrington Wimberly, Oklahoma editor and publisher, and Richard Sasche, member of the California Railroad Commission, were nominated last month by President Truman to fill vacancies on the Commission.

• Particularly timely in this issue is the article (Page 35) on some legal aspects of the exportation of gas by Marshall Newcomb, attorney for Lone Star Gas Co., Dallas.

• With the completion of six successful wells in eight attempts, Bata Petroleum, Ltd. appears to have discovered a new major gas field in the Canadian province of Saskatchewan.

• Walter C. Beckjord, vice president of Columbia Gas & Electric Co. and a past president of A.G.A., has been named president of the Cincinnati Gas & Electric Co., succeeding H. C. Blackwell, who becomes board chairman.

• Helium, according to a recent Bureau of Mines report, is being used as a tracer gas, turning up heretofore unknown facts about the underground migration of oil and gas.

• Servel has mailed certificates of loyal and faithful service to all wartime employees of the company. The certificates are signed by President Louis Ruthenburg and also by the vice president, superintendent, and foreman of the division in which each worker was employed.

• Due primarily to the drafting of university students preparing for careers as chemists and engineers, the United States is now facing a serious situation in industrial research, according to charts published in *The Scientific Monthly*. Since 1940 doctors degrees granted in engineering have dropped from 100 to almost 0; in chemistry from over 700 to about 200.

• In this issue of *GAS* is a special section featuring the Pacific Coast Gas Association's Convention-in-Print. For the complete contents turn to Page 55.

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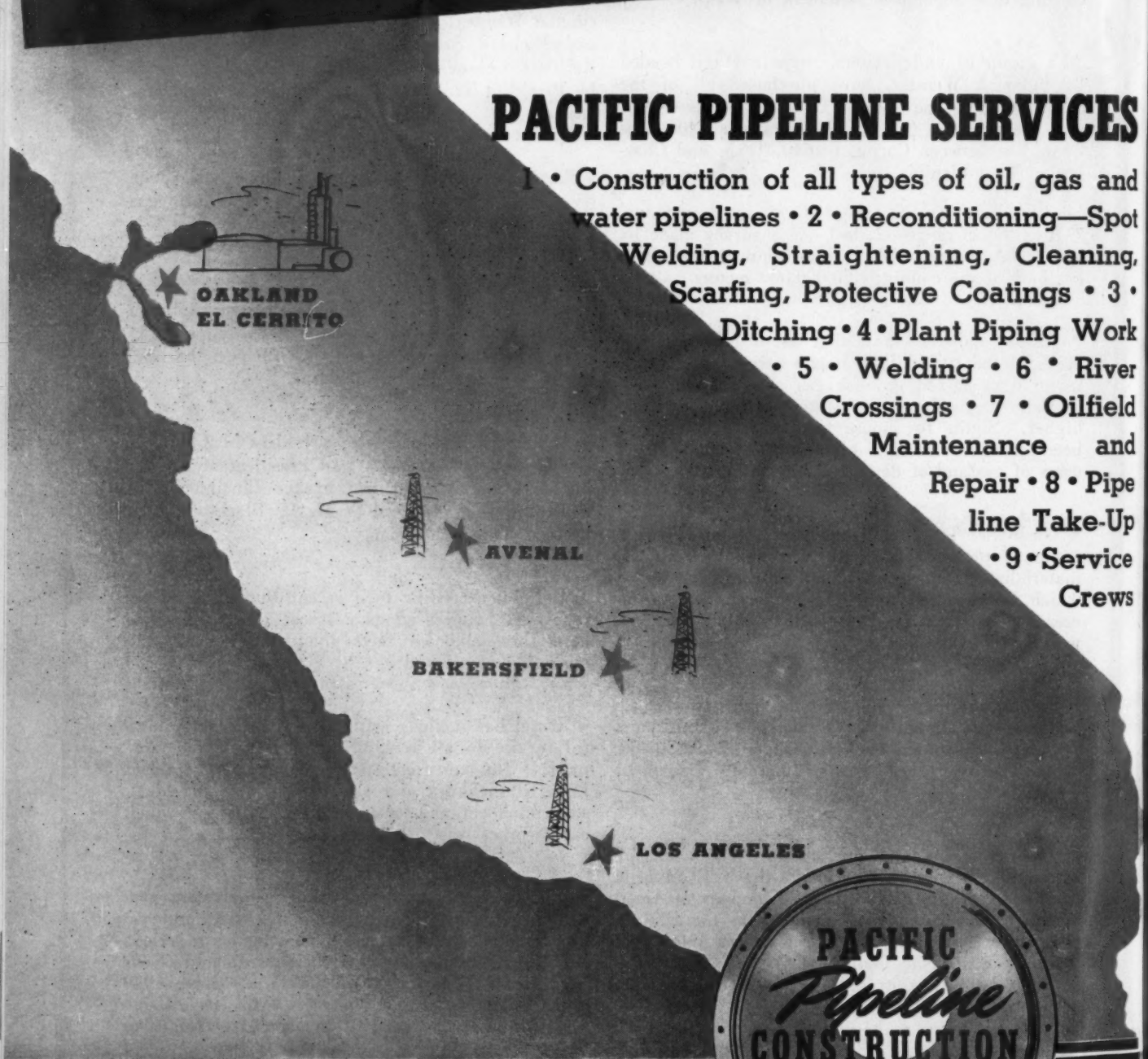

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LEGAL ASPECTS

Of the Transportation of Natural Gas in Interstate Commerce

By MARSHALL NEWCOMB
General Attorney, Lone Star Gas Co., Dallas, Texas

ONLY in recent years have the natural gas producing states of the southwest come to realize the real value of natural gas. The advent of the long distance interstate pipelines and the recent discoveries and developments which make practical the utilization of natural gas for manufacturing by-products and chemicals have created a large demand for natural gas production and acreage. For many years interest in the petroleum industry centered almost exclusively upon oil, and to discover gas in the search for oil was considered a misfortune. The progress and growth of the natural gas industry, as well as the vicissitudes encountered in the process of this growth, are interestingly related in the dissenting opinion of Mr. Justice Jackson in the Hope Case.[1]

The wide and important uses made of natural gas in recent years have also created an awareness that wasteful practices of the past must be stopped. The states through their legislatures, regulatory agencies, and the Interstate Oil Compact Commission have shown increased energy in providing and applying laws and regulations to prevent both underground and surface waste of this valuable natural resource.

The long distance interstate pipelines and the expanding interstate markets for natural gas prompted the Congress in 1938 to declare "that the business of transporting and selling natural gas for ultimate distribution to the public is effected with a public interest, and that federal regulation in matters relating to the transportation of natural gas and the sale thereof in interstate and foreign commerce is necessary in the public interest;" and the Congress provided an elaborate system for federal regulation of "the transportation of natural gas in interstate commerce, — the sale in interstate commerce of natural gas for resale for ultimate public consumption for domestic, commercial, industrial, or any other use, and *** natural gas companies engaged in such transportation or sale."[2]

The depletion of gas reserves in the Appalachian area has created a serious shortage in the states of that region, and the states of Kansas, Oklahoma, Louisiana and Texas have become major sources of supply for gas moving in interstate commerce.[3] In each of these states there have been advocates for state legislation which would prohibit the exportation of natural gas altogether, or limit the quantity which could be exported, or by discriminatory taxation discourage its transportation out of the state. Quite recently Louisiana has challenged in the Federal Courts an order of the Federal Power Commission granting an interstate pipeline company authority to construct additional facilities for the exportation of gas from that state.[4] The decision of the United States Circuit Court of Appeals went against Louisiana, but the case is now pending before the Supreme Court of the United States.

Louisiana took the position that certificates of public convenience and necessity should not stand because they were issued to permit the exportation of gas for burning under boilers, an industrial use that is regarded as inferior and wasteful, and, therefore, the granting of the certificates was not in, but against, the public interest. The coal and railroad interests have taken the same view. They have consistently opposed the granting of certificates of public convenience and necssity by Federal Power Commission on the grounds that the use of natural gas for industrial and space-heating purposes constitutes a dissipation of the natural gas resources, and threatens the coal industry.[5] One may justifiably suspect that the opposition of the railroad and coal interests stems more from their desire to protect their own businesses from competition than from any real desire to husband the natural resources for so-called "superior" uses. However, in a case decided April 26, 1944,[6] the Federal Power Commission stated that the Commission had given careful consideration to the broad issues of public convenience and necessity raised by the intervening coal and railroad interests, who referred to the projects as segments of an over-all progressive encroachment of natural gas upon the commercial fields of solid fuels and stressed the view that natural gas should not be dissipated in large industrial plants where coal is available and can be readily and economically substituted. The Commission stated that it was cognizant of the necessity of conservation of the country's irreplaceable natural gas resources, and that considerations of conservation were material to the issuance of certificates under Section 7 of the Act.

Marshall Newcomb

THE SUREST WAY to hasten federal regulation of the production and conservation of natural gas, according to Mr. Newcomb, is to undertake to stop or seriously interfere with its transportation and sale in interstate commerce. Nothing is more definitely settled in the constitutional law of this nation than that the power of the Federal government to regulate interstate commerce carries with it all power necessary to preserve, foster and protect that commerce. Therefore, any state which proceeds on the false premise that it can retain its natural gas within its own borders through the enaction of any law, regulation or taxation which has the practical effect of directly burdening, regulating or prohibiting the sale or transportation of natural gas in interstate commerce, is wasting its time, energy and money. The state is without power to prevent privately owned articles of trade from being shipped or sold in interstate commerce on the ground that they are required to satisfy local demands or because they are needed by the people of that state. This paper was presented before the Gas Division, Oklahoma Utilities Association, Oklahoma City, Sept. 21, 1945.

I mention these activities, occurring in the field of Federal regulation, because they have a direct bearing upon the quantities of gas which may in the future be exported from the producing states. To prohibit or restrict the utilization of natural gas for industrial and space-heating purpose will substantially reduce the quantity exported. Such action would unquestionably create an important impact upon the economy of the producing states and seriously affect the financial soundness of the companies which engage primarily in interstate transportation and sale of natural gas.

But it is my main purpose to discuss the legal aspects of the exportation of natural gas from the state and not the Federal angle.

Position of States

The states should not proceed on the false premise that the exportation of natural gas to other states can be prohibited by state action. It is plainly not permissible for a state to deal with its natural gas on the supposition that its sale, transportation and consumption in interstate commerce can be prohibited. Any law, regulation or taxation which has the practical effect of directly burdening, regulating or prohibiting the sale or transportation of natural gas in interstate commerce will represent a waste of time, energy and money. Under our National Constitution, commerce in natural gas between the states can be neither prohibited nor regulated nor directly taxed by the states. In dealing with this subject, it must never be forgotten that, governmentally and economically speaking, each state is a part of an indissoluble nation. The welfare of the nation as a whole is paramount to the economic interests or grandeur of any particular segment thereof.

The early Confederacy was abandoned in favor of the United States under our present Constitution because it had been proved by actual experience that a strong, virile and prosperous nation could not be created or maintained unless barriers to commerce between the states were eradicated and control of commercial intercourse between the states vested in the hands of a national authority which would be uninfluenced by the ambitions of a particular section or region.

One of the principles of the Constitutional Convention was to obtain and promote unobstructed commerce among the states. The inability of the national government, as created by the articles of confederation, to deal effectively with commerce was one of the prime causes of the call for the constitutional convention. "It may be doubted," said Marshall, "whether any of the evils proceeding from the feebleness of the federal government contributed more to that great revolution which introduced the present system than the deep and general conviction that commerce ought to be regulated by congress."[7]

In the commerce clause the people of the United States sought protection of individual liberty of trade and all of its incidents from the stifling and conflicting regulations of the several states. Few things were better known, remarked Daniel Webster in the course of his argument in Gibbons v. Ogden,[8] than the immediate causes which led to the adoption of the present constitution; and he thought nothing clearer than that the prevailing motive was to regulate commerce; to rescue it from the embarassing and destructive consequences resulting from the legislation of so many different states, and to place it under the protection of a uniform law.

By the confederation, divers restrictions had been imposed on the states; but these had not been found sufficient. No state, it was true, could send or receive an embassy; nor make any treaty; nor enter into any compact with another state, or with a foreign power; nor lay duties, interferring with treaties which had been entered into by congress. But all these were found to be short of what the actual condition of the country required. The states could still, each for itself, regulate commerce, and the consequence was, a perpetual jarring and hostility of commercial regulation—a welter of iniquitous laws and impolitic measures — "from which grew up a conflict of commercial regulations, destructive to the harmony of the states, and fatal to their commercial interests abroad."[9]

Oklahoma Law

The state of Oklahoma in 1907 enacted a law which prohibited the granting of a charter to, or the exercise of the right of eminent domain, or the right to use the highways of the state by any corporation engaging in the transportation of natural gas unless such corporation should agree that it would not connect with, transport to or deliver natural gas to individuals, associations, co-partnerships, companies or corporations engaging in transporting or furnishing natural gas to points, places or persons outside the state. A similar restriction was imposed upon foreign corporations by providing that they should not be licensed or permitted to conduct business within the state.

The Kansas Gas Company was engaged in purchasing gas in Oklahoma and transporting it by pipeline to points of consumption in Kansas. Other corporations were similarly engaged. Upon the suit of these corporations to enjoin enforcement of the Act, the court was required to directly decide the question of whether Oklahoma could prohibit the exportation of gas by private concerns to points of consumption in Kansas. Oklahoma complained that it needed all of its gas for use by its own citizens. It showed that its population was steadily increasing, that it had no domestic fuel except coal and natural gas; that its supply of coal was growing rapidly more costly to produce; that the petroleum oil produced in the state was practically all transported out of it; and that substantially the only natural, practicable, usable fuel, both for domestic and industrial use, was natural gas. Oklahoma, by evidence, painted a dismal picture for itself and its citizens if the existing and planned exportation of natural gas in great quantities were permitted to continue.[10]

Supreme Court Decision

In summarizing the effect and intent of the legislation, the Supreme Court of the United States said:[11]

> "The statute presents no embarassing questions of interpretation. It was manifestly enacted in the confident belief that the State had the power to confine commerce in natural gas between points within the State, and all of the rights conferred on domestic corporations, all of the rights denied to foreign corporations, were means to such end."

Oklahoma contended that it had a right to conserve its natural resources for its own citizens and the right to preserve a common supply for the equal uses of all those who may by law resort to it. In denying to Oklahoma the asserted power, the court said:

> "If the states have such power a singular situation might result. Pennsylvania might keep its coal, the Northwest its timber, the mining states their minerals. And why not the products of the field be brought within the principle? * * * If one state has it, all states have it; embargo may be retaliated by embargo, and commerce will be halted at state lines. And yet we have said that 'in matters of foreign and interestate commerce there are no state lines.' In such commerce, instead of the states, a new power appears and a new welfare, a welfare which transcends that of any state. But rather let us say it is constituted of the welfare of all of the States and that of each state is made the

> greater by division of its resources, natural and created, with every other state, and those of every other state with it. This was the purpose, as it is the result, of the interstate commerce clause of the Constitution of the United States."[12]

In 1919 West Virginia enacted a statute which taxed the transportation of natural gas and oil by pipe lines. The statute was assailed on the grounds that it imposed a tax upon commerce among the states. The Supreme Court of the United States declared it invalid as to both oil and gas transported in interstate commerce.[13] Because of the rather devious method of levying and collecting the tax, the highest court of the state ruled that it applied only to interstate commerce. But the supreme court said that a state tax to be valid "must not in its *practical* effect and operation burden interstate commerce."[14]

Any valid tax upon natural gas which ultimately moves in interestate commerce must be levied upon the production, that is, before the gas is sold in or commences its journey in interstate commerce, and it must be nondiscriminatory in its operation.[15]

Again in 1919 West Virginia enacted a statute which was intended through regulation of pipe line companies, to compel the retention within West Virginia of all natural gas there produced which might be required for local needs. The facts showed that the effect of the statute was such that, directly and immediately, it would work a large curtailment of the volume of gas going into the states of Ohio and Pennsylvania and, in a few years, with increasing demand and decreasing production, would work a practical cessation of the interstate stream which it was the object of the suits to protect. Ohio and Pennsylvania brought suit to enjoin enforcement of the statute on the grounds that it directly interfered with interstate commerce. They rested their right to relief on the grounds that to enforce the statute would subject them to irreparable injury in respect to many of their public institutions and governmental agencies which long had been and were then using natural gas produced in West Virginia.[16]

In its opinion the court recites the history of natural gas in West Virginia, showing that initially large quantities of gas were available, more than enough to supply all the demands of West Virginia consumers and those of Ohio and Pennsylvania. Gradually there was a dimunition in the supply due to large withdrawals by interstate as well as intrastate public utility pipelines. The point was reached where all of the demands of West Virginia consumers could not be supplied without limiting the amount of gas transported into Pennsylvania and Ohio. Each suit presented the direct issue between two states as to whether one might withdraw a natural product, a common subject of commercial dealing, from an established current of commerce moving into the territory of the other.[17]

The court ruled that the challenged statute was invalid. It rested its decision upon the Commerce Clause and, in the course of its opinion, said:

> "Natural gas is a lawful article of commerce and its transmission from one state to another for sale and consumption in the latter is interstate commerce. A state law, whether of the state where the gas is produced or that where it is to be sold, which by its necessary operation prevents, obstructs or burdens such transmission is a regulation of interstate commerce—a prohibited interference."[18]

The court considered and overruled the contentions that since the pipeline companies were public utilities within West Virginia the latter state had the right to require them to furnish reasonably adequate service within reasonable territorial limits even to the exclusion of adequate service to consumers beyond the limits of West Virginia; that natural gas was a product of the state, had become a necessity therein, the supply was waning and no longer sufficient to supply local needs and be used abroad, and the Act was therefore a legitimate measure of conservation in the interest of the people of the state.

Private Ownership of Gas

Natural gas is property subject to absolute private ownership. Usually it is privately owned, sold and transported pursuant to contracts between private parties and by means of facilities privately owned and controlled. This characteristic distinguishes it from wild animals in which there can be no private ownership. The state may prohibit transportation of the latter in interstate commerce.[19]

By statutory enactment Louisiana declared all shrimp and parts thereof within its waters to be the property of the state, and sought to regulate their taking and reduction to private ownership. It granted the right to take, can, pack and dry shrimp to residents and also to corporations, domiciled or organized in the state, operating a canning or packing factory or drying platform therein. The Act made it unlawful to export from the state any shrimp from which the heads and hulls had not bee removed. But, in order that all its inhabitants "may enjoy the state's natural food product," the Act declared it lawful to ship unshelled shrimp to any point within the state. Thus Louisiana sought to protect its important and valuable shrimp beds from the ravages of canners who exported them to canneries located outside that state. What Louisiana sought to accomplish was stated in her argument before the court, thusly:[20]

> "The primary purpose of the statutes is to increase the industries of the State, develop its resources, and add to its wealth and prosperity, by causing to be located within its borders the necessary plants for canning and packing oysters and drying and canning of shrimp, and for the manufacture of fertilizer for the hulls of the shrimp, to be used for the benefit of the state, and primarily to be sold within its borders."

The rulings of the court, in answer to this argument, are significant in view of the quite similar arguments advanced by proponents of state action to stop the exportation of gas in order that industries might be attracted to the producing states.

One challenging the validity of a state enactment on the ground that it is repugnant to the commerce clause is not necessarily bound by the legislative declarations of purpose. It is open to him to show that in their practical operation its provisions directly burden or destroy interstate commerce. *** In determining what is interstate commerce, courts look to practical considerations and the established course of business. *** Interstate commerce includes more than transportation; it embraces all the component parts of commercial intercourse among states. And a state statute that operates directly to burden any of its essential elements is invalid. *** A state is without power to prevent privately owned articles of trade from being shipped and sold in interstate commerce on the ground that they are required to satisfy local demands or because they are needed by the people of the state.[21]

Other Laws Invalid

Many other forms of state legislation which operated to regulate or hinder free intercourse between the states have been declared invalid. Rather recently New York sought to protect its farmers and those engaged in the dairying industry from the unfair competition of cheap milk imported from other states. It sought to protect the prosperity of the New York farmers by regulating the price

to the farmers of milk produced and sold within the state, and by providing for the equalization of the cost of domestic and imported milk. The Act prohibited dealers from selling in the state milk produced outside the state where such milk was purchased from the producer at less than the minimum price fixed for similar milk produced within the state. In striking down this law the Supreme Court said:[22]

> " * * * a chief occasion of the commerce clauses was 'the mutual jealousies and aggressions of the states, taking form in customs barriers and other economic retaliation." Farrand, Records of the Federal Convention, vol. II, p. 308; vol. III, pp. 478, 547, 548; The Federalist, No. XLII; Curtis, History of the Constitution, vol. 1 p. 502; Story of the Constitution, Sec. 259. If New York, in order to promote the economic welfare of her farmers, may guard them against competition with the cheaper prices of Vermont, the door has been opened to rivalries and reprisals that were meant to be averted by subjecting commerce between the states to the power of the nation.
>
> " * * * To give entrance to that excuse would be to invite a speedy end of our national solidarity. * * * "

States may adopt and enforce all needed regulations for the conservation of natural gas so long as such regulations apply to intrastate transactions and before interstate commerce begins.

State Powers

From the litigation provoked by various state conservation statutes, it has been judicially declared that a state has the power to:

1. Shut in an oil well when casinghead gas is not used;[23]

2. Close in a gas well when the gas is used for making natural gasoline and the residue is dissipated;[24]

3. Permit the use of gas for one beneficial purpose and deny its use for another beneficial purpose;[25]

4. Exclude from the channels of commerce illegally produced oil;[26]

5. Restrict the flow of oil to prevent above ground or surface waste and conserve or equally distribute reservoir energyy;[27]

6. Restrict the flow of oil so that each common owner may have a reasonable opportunity to recover his fair share;[28]

7. Limit the number of wells to be drilled on a given amount of land when such limitation does not amount to confiscation of private property.[29]

This specific enumeration of the powers which a state may exercise in conserving oil and natural gas by no means exhausts the field in which state action in such matters has been or may be sustained. They are merely illustrative. Such regulations are not regulations of interstate commerce because they apply to production and before commerce has commenced.

A restriction of production moreover is not aimed at commerce. It forbids the production of the article, not its export to another state after production.[30] The dimunition of the volume of exports in the one case and of imports in the other is incidental and indirect. Its effect is wholly collateral to the main purpose of the statute. Thus, in the Champlin Refining Company case the court pointed out that the challenged regulations "apply only to production and not to sales or transportation of crude oil or its products. Such production is essentially a mining operation and therefore is not a part of interstate commerce even though the product obtained is intended to be and in fact is immediately shipped in such commerce." But such regulations must not operate to take the property of one and give it to another or seriously to impair, under the guise of regulation, either the rights of property protected by the Fourteenth Amendment,[31] or the right to engage in interstate commerce.

The Federal government has not undertaken to directly regulate the production or conservation of natural gas and oil.[32] The Natural Gas Act expressly excludes from its terms intrastate transportation or sale of natural gas, local distribution of natural gas, and the production or gathering of natural gas.[33] It does authorize Federal Power Commission to assemble information and recommend to congress further legislation which may appear to be appropriate to carry out compacts between the states dealing with conservation and to aid in the conservation of natural gas resources within the United States and in the orderly, equitable and economic production, transportation and distribution of natural gas.[34]

Recently the Supreme Court has said that the Natural Gas Act does not intrude on the domain traditionally reserved for control by state commissions; that the Congress recognized the legitimate interest of the states in the conservation of natural gas;[35] and that Federal Power Commission is precluded from exercising any control over the activity of producing or gathering natural gas.[36]

Those who advocate state action to discourage by taxation or prohibit by direct legislation the exportation of natural gas also decry federal encroachment in matters of oil and gas conservation and production. In my opinion the surest way to hasten federal regulation of the production and conservation of natural gas is to undertake to stop or seriously interfere with its transportation and sale in interstate commerce. Nothing is more definitely settled in the constitutional law of this nation than that the power of the federal government to regulate interstate commerce carries with it all power necessary to preserve, foster and protect that commerce. State action in the field of production and conservation has been sustained because of its local character and wide scope for local regulation, and, in my opinion, will be sustained in the future only so long as there is no substantial impairment of the national interest and no material obstruction of the free flow of commerce.[37]

REFERENCES

[1]320 U.S. 591, 630-639.

[2]Natural Gas Act, 15 U.S.C.A. 717.

[3]Figures obtained from a reliable source show that in 1943 the quantity of gas exported from the four states named was as follows:

Texas	305,656 MMcf
Oklahoma	69,596 MMcf
Kansas	76,219 MMcf
Louisiana	224,219 MMcf

These figures do not take into account the quantity of gas imported into each state. For instance, gas is imported from Oklahoma into Texas and from Texas into Oklahoma. Texas also imports gas from Louisiana and New Mexico.

[4]Department of Conservation of State of Louisiana et al v. Federal Power Commission, 148 Fed. (2) 746.

[5]Tennessee Gas & Transmission Company, F.P.C. Opinion No. 93-A, Release No. 2269; and also Department of Conservation of State of Louisiana v. Federal Power Commission, 148 Fed. (2) 746.

[6]Re: Hope Natural Gas Company, et al, F.P.C. Release No. 2417, Opinion No. 114.

[7]Brown v. Maryland, 12 Weat. 419.

[8]9 Wheat. 11

[9]Gibbons v. Ogden, 9 Wheat., at page 224.

[10]It is of passing interest to note that the concern thus evidenced by Oklahoma, in 1907 has proved unwarranted by the fact that natural gas is now being supplied to its citizens in abundant quantities and is also being exported from Oklahoma to Texas, Kansas and other points

[11]Oklahoma v. Kansas Natural Gas Co., 221 U. S. 229, 250.

[12]Id. p. 255.

[13]Eureka Pipe Line Co. v. Hallanan (Oil), 257, U.S. 265, 266, and United Fuel Gas Co. v. Hallanan (Gas), 257 U.S. 277.

[14]Id. p. 272.

[15]Hope Natural Gas Co. v. Hall, 274 U.S. 284, 286; Parker v. Brown, 317 U.S. 341, 360, 361.

[16]Pennsylvania v. West Virginia, 262 u.s. 553.

[17]Id. p. 591.

[18]Id. pp. 596-597.

[19]Greer v. Connecticut, 161 U.S. 519; and see dissenting opinion in Foster v. Haydel, 278 U.S. 1, 14.

[20]Foster v. Haydel, at p. 3.

[21]Id. p. 10.

[22]Baldwin v. G.A.F. Selig, 294 U.S. 511, 522, 523.

[23]Ohio Oil Company v. Indiana, 177 U.S. 190; Bandini Petroleum Co. v. Superior Court, 284 U.S. 8.

[24]F. C. Henderson, Inc. v. Railroad Commission, 56 Fed. (2) 218.

[25]Henderson v. Thompson, 300 U.S. 258; Walls v. Midland Carbon Co., 254 U.S. 300; Lindsley v. Natural Carbonic Gas Co., 220 U.S. 61.

[26]Thompson v. Spear, 91 Fed. (2) 430; Griswold v. The President, 82 Fed. (2) 922; Panama Refining Co. v. Railroad Commission, 16 Fed. Supp. 289.

[27]Champlin Refining Co. v. Corporation Commission, 286 U.S. 210; Railroad Commission of Teas v. Rowan & Nichols Oil Co., 310 U.S. 573.

[28]Ohio Oil Co. v. Indiana, 177 U.S. 190; Walls v. Midland Carbon Co., 254 U.S. 300; Railroad Commission of Texas v. Rowan & Nichols Oil Co., 310 U.S. 573; Carzelius v. Harrel, 186 S.W. (2) 961.

[29]Railroad Commission of Teas v. Rowan & Nichols Oil Co., 310 U.S. 573.

[30]Parker v. Brown, 317 U.S. 341, 360, 361.

[31]Thompson v. Consolidated Gas Utilities Corp., 300 U.S. 55.

[32]In Bufford et al v. Sun Oil Co. et al, 319 U.S. 315, 319, the Supreme Court of the United States made the none too reassuring observation that "The Federal government, *for the present at least*, has chosen to leave the principal regulatory responsibility with the States, but does supplement control." Citing the Connally Hot Oil Act, 15 U.S.C.A., Sec. 715.

[33]15 U.S.C.A., Sec. 717(b). But under this Act certain indirect regulations are accomplished; Colorado Interstate Gas Company v. Federal Power Commission, 324 U.S. —, 89 L. Ed., Advance Opinions, p. 807.

[34]15 U.S.C.A., Sec. 717j(a).

[35]Federal Power Commission v. Hope Natural Gas Company, 320 U.S. 591, 612-613.

[36]Colorado Interstate Gas Company v. Federal Power Commission, 324 U.S. —, 89 L. Ed., Advance Opinions, p. 807, 819.

[37]Parker v. Brown, 317 U.S. 341, 360-363.

FPC'S INVESTIGATION OF NATURAL GAS

(Excerpts from the Summaries of Testimony)

By LOUIS E. WHYTE

Independent Natural Gas Association of America

EXCERPTS FROM the summaries of testimony before the Natural Gas Investigation Hearings of the Federal Power Commission in Kansas City, Mo. as prepared by Louis E. Whyte of the Independent Natural Gas Association of America.

HEARINGS of the Federal Power Commission's comprehensive natural gas investigation began last month in Kansas City.

Commissioner Nelson Lee Smith presiding at the opening session, announced the purpose and scope of the hearings. He emphasized that the investigation is a fact-finding inquiry for the benefit of the Commission, the Congress, interested parties and the general public.

Witnesses listed by the FPC to testify at Kansas City include John B. Gage, Mayor of Kansas City; Governor Andrew F. Schoeppel of Kansas; Dr. E. DeGolyer of Texas; the Missouri Public Service Commission; R. B. McEntire, Chairman of the Kansas State Corporation Commission; T. A. Morgan, its Director of Conservation; L. B. Taylor, its petroleum engineer; Frank C. Arthur, chief engineer; Benjamin Miller, New York City; Dr. C. M. Marberg and Dr. P. E. Pratt of the Midwest Research Institute, Kansas City Testing Laboratory; the City of St. Louis; Helmerich and Payne; Shoemaker and Procter; and the American Retail Coal Association.

B. A. HARDEY, an independent operator of Shreveport, La., presented a resolution adopted by the Oil and Gas Production Committee of the Independent Petroleum Association of America. The resolution stated:

"The regulation and jurisdiction over the production and conservation of natural gas, including gathering, compressing, recycling operations, gasoline plants, sale and delivery of natural gas at the point where interstate commerce commences, is the vested and constitutional right and power of the state and state regulatory bodies in which such is produced, and no jurisdiction in that respect should be conferred upon the Federal Power Commission or other federal agencies. Nor should the Federal Power Commission, or other Federal agencies, seek either to exert or exercise any power or jurisdiction not specifically conferred by law under the Constitution.

The power and jurisdiction over the end use of gas should not be conferred upon a Federal bureau. Competition between fuels should be left to the determination and decision of free competition stripped of the influence of special groups and advantages resulting from attempted administrative control. The policy of the United States in respect to interstate commerce is freedom in competition, and such policy should be maintained and continued.

The authority for adequate regulations in the public interest governing the production, storage, gathering and handling of natural gas now rests with the States and no Federal laws are now either justified, demanded or needed in this respect.

The function of the Federal Government under the constitution is to regulate interstate commerce. Federal agencies should no more assert jurisdiction over oil or gas operations within a state than the state should interfere with the transmission and transportation of natural gas in interstate commerce.

If and should the Federal Power Commission persist in its attempted control, either directly or indirectly, of the production, processing, gathering and compressing, or the price of gas prior to its sale for resale from the main tranportation line in interstate commerce, or in incorporating producing and gathering properties in the rate base for determining rates for transmission in interstate commerce, then either the functions of the Federal Power Commsision in respect to the interstate transmission of natural gas should be transferred to the Interstate Commerce Commission now having control of the transportation of other commodities in interstate commerce or otherwise the jurisdiction of the Federal Power Commission should be, by additional legislation, clearly limited to the interstate transportation of gas and the sale of gas in interstate commerce for resale.

The policy of the Federal Power Commission in attempting to give gas producing and gathering properties a utility status and the valuation of gas producing properties and natural gas on a cost formula is without and beyond the jurisdiction of the Federal Power Commission. The utility principal of regulation is not and cannot be adapted to the gas producing and gathering business and at the same time maintain a healthy industry. The devaluation of gas producing and gathering properties and natural gas in low-cost gas producing areas based upon cost directly tends to encourage waste, destroys the inducement to save gas, and is a positive deterrent and obstacle to gas conservation and good gas producing and gathering practices.

Congressional Control

The Congress of the United States has the sole and exclusive function of legislation with respect to the factors and principles controlling the granting or withholding of certificates. The Federal Power Commission is without power to legislate in these respects by the attempted promulgation of rules, legislative in nature, not prescribed by Congress, for adjudicating the granting or withholding of certificates of convenience and necessity.

Efforts of the Federal Power Commission to extend, by means of its power to regulate sales of gas for resale in interstate commerce, its jurisdiction to the gas producing and gathering properties of a producer who is not a natural gas company exceed the power vested in the Commission. The conservation, marketing and the prevention of waste of gas will be substantially aided by the removal of such unauthorized threats and attempts either by abandonment of such efforts or by legislative mandate.

That the exercise by the Federal Power Commission, or other Federal agencies of an overlapping or concurrent jurisdiction with that properly vested in the states under their power of sovereignty, results and will result in chaos, confusion, and contra-

dictions which are and will be injurious to the industry, the public, and tend to make inert the effectiveness of both the Federal and state agencies; that both Federal and state agencies should have their respective power or jurisdiction clearly defined so that there will be no interference of the one with the other.

BENJAMIN MILLER, private consultant of New York City, retained by the State of Kansas, gave testimony relative to a survey of plants now actually producing materials from natural gas including synthetic rubber, military material and the Fischer-Tropsch synthesis of motor fuel.

During the questioning by attorneys, Mr. Miller said that gas could go to 15c per Mcf. and still compete with coal for making these products. On the question of transportation, he said that it would be cheaper to establish manufacturing plants near the gas fields and ship the manufactured products for further processing than to pay for the transportation of the gas to distant manufacturing points. He also said that the availability of an adequate labor supply, however, has much to do with dictating the location of the manufacturing plants.

As long as the price of crude oil stays somewhere near its present level, there will have to be considerable improvement in the Fischer-Tropsch method before it will be commercially feasible to produce gasoline from natural gas at a competitive price. But, he added, if the price of crude oil should substantially advance, or if the reserves of crude oil should play out, "then the situation would be entirely different."

It takes about 10,000 cu. ft. of natural gas to produce a barrel of gasoline, thus making the raw material cost extremely low. However, the labor, equipment and maintenance costs involved in the Fischer-Tropsch method make the cost of production of gasoline considerably higher than the cost of getting gasoline from crude oil.

MILTON M. KINSEY, President of the St. Louis Board of Public Service, urged that there be no restrictions placed on the exportation nor in the use of natural gas, but recommended that direct industrial sales made by pipe lines be placed under some kind of control, preferably under a state or local regulatory agency.

"We view with concern the growing tendency to suggest the restriction or prohibition against the exportation of natural gas. In this category also is the substitute suggestion for the enactment of severance taxes which would have a similar final result . . . It would seem that a provincial policy on the part of one state which is the producer of a natural resource would tend to endanger retaliatory action by other states who produce other natural resources."

Referring to the present situation in St. Louis, and the possibility of revising the Mississippi-Laclede contract, Mr. Kinsey said that there would then be a situation where Mississippi "with its freedom from reguluation, may secure a large percentage of the available dump and interruptible business, thereby preventing Laclede from earning an advantageous load factor, which, in turn would result in higher average gate rate costs for domestic gas"; and "the existence of an unregulated utility business leads to the possibility of discrimination as between similar customers."

"We believe," he said, "that simple prudence dictates the adoption of measures designed to prevent this situation from becoming burdensome to the domestic user . . . We do not recommend that the authority of the Federal Power Commission be extended to include jurisdiction over direct sales unless that be the only legal ground. We would prefer state regulation because we do not believe the resultant divided responsibility of the state commission and other industrial sales in the same city under the jurisdiction of a federal commission would be the most desirable arrangement."

He suggested the possibility that direct industrial sales by interstate pipelines might, by appropriate action of Congress, be delegated to the local regulatory commission. Another possibility, he added, might be enactment of a law by Congress prohibiting an interstate pipeline company from selling gas direct to an ultimate consumer.

Standard of Calif. Plans Expansion Program

Plans for a construction program totaling more than $20,000,000 have been announced by H. D. Collier, president of Standard of California. This program, suspended by the war, will include additions and improvements to refinery, storage, distributing, producing and office facilities of Standard and its domestic facilities. The program will also cover the installation of new laboratories to keep Standard in the forefront of petroleum technological advances.

Hugoton, Kans. to Have Municipal Gas Well

Hugoton, Kans., has received a permit from the PAW for a municipal gas well as a result of special legislation by the 1945 Kansas Legislature. Negotiations for a drilling contract and other arrangements are under way and drilling will be started shortly.

Hugoton will be the only town in the world, so far as known, with a municipal gas well. A contract has been entered into with Northern Natural Gas Co. to take the entire output of the well.

Miriam McKinley and Martha Koroknay, Tappan secretaries, demonstrate the operations of the the "Tappan Jiffey Doodler," the range that will "automatically" prepare a full course meal in six minutes.

TRAINING PROGRAM
for Gas Appliance Servicemen

No. 4. General Principles of Gas Utilization

By C. C. WESTMORELAND

THE term "General Principles of Gas Utilization" is used in this case to identify the vast amount of general information that an appliance mechanic needs to have at his command in order to efficiently solve service problems encountered in gas-burning equipment. A title such as "Elementary Physics in Gas Appliance Operation" might more accurately and clearly describe the body of facts to be discussed under such a heading for we find the physical properties of gas, the process of combustion, the theory of gravity venting, burner design, heat transfer, hydraulics (as applied to heating controls), coefficient of expansion of metals (as applied in bi-metallic and rod and tube controls) and the use of thermocouples in gas controls are fundamentals that stem from elementary physics.

The fact that gas equipment is quite durable, and the public is inclined to use equipment past its period of best performance, makes it necessary for the trained appliance serviceman to know when to service and when not to service an appliance. In making such a decision, the serviceman may knowingly or unknowingly be applying a knowledge of physics. In any event, he needs a sound background of the fundamentals of "gas physics" to guide him in discriminating between equipment that is outdated, antique, and in some cases, hazardous.

The necessity for equipping the serviceman with this basic knowledge becomes more apparent when one considers the many models annually put in the field by manufacturers of gas equipment. These present a wide variety, and when included along with models from years past, present endless variations and problems to be met in repairing and servicing. Since it is impossible for a course of training to encompass all of these numerous types, the only "equipment" the servicemen can be given is a basic knowledge of the fundamentals underlying the operation of gas burning mechanisms. These laws or fundamentals are equally applicable to the

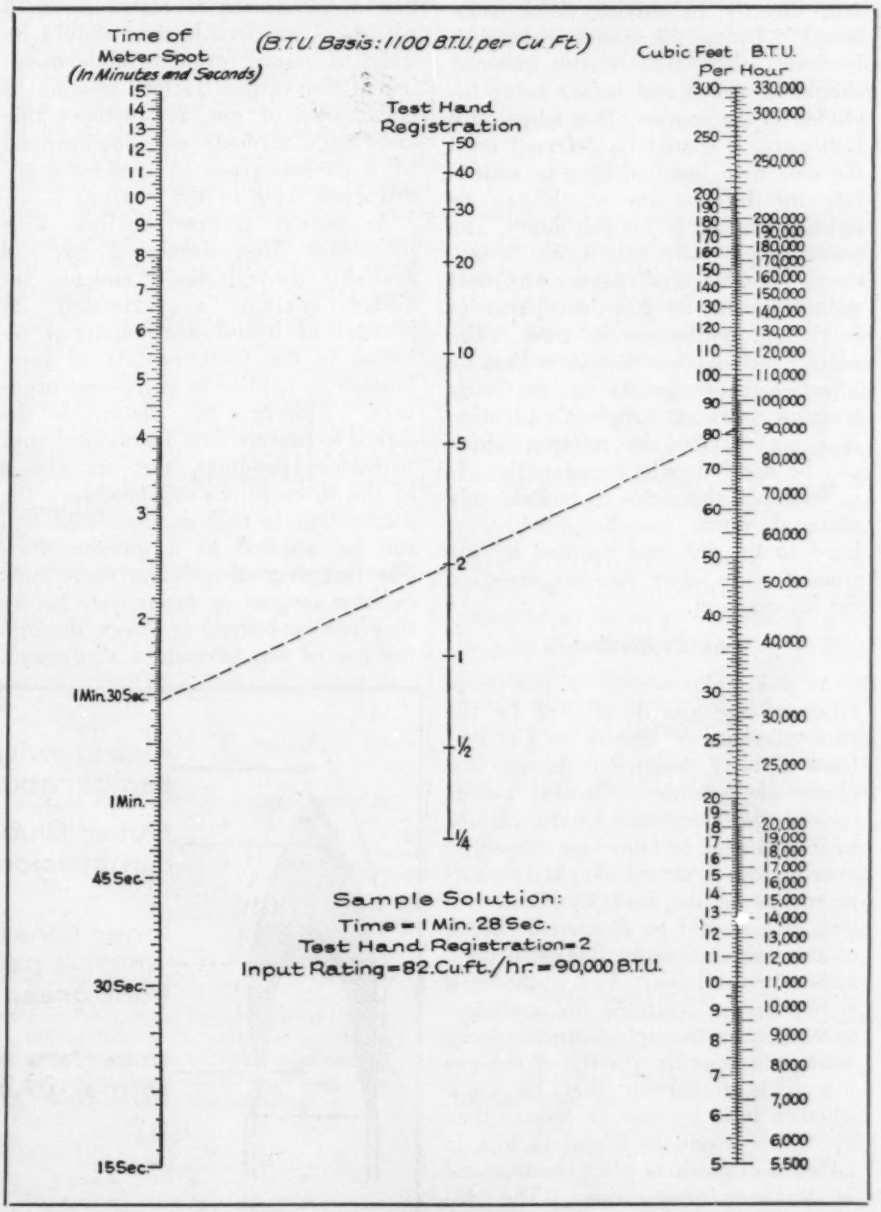

Time of Meter Spot (In Minutes and Seconds)
(B.T.U. Basis: 1100 B.T.U. per Cu. Ft.)
Cubic Feet Per Hour
B.T.U. Per Hour
Test Hand Registration
1 Min. 30 Sec.
1 Min.
45 Sec.
30 Sec.
15 Sec.
Sample Solution:
Time = 1 Min. 28 Sec.
Test Hand Registration = 2
Input Rating = 82 Cu. ft./hr. = 90,000 B.T.U.

FIG. 1. Alignment chart for determining gas flow through meters (range 5-300 cu. ft. per hour).

various appliances and accessories the serviceman may be called upon to adjust in the field.

There is occasionally a tendency to make this section of the course rather involved and technical because of the great amount of material available as a result of the technical research which has been done in this field. If all service personnel had a background of considerable scientific or engineering training, the available material could be used in its present form. But since most applicants for this type of work do not have the advantage of such training, it is necessary to keep the discussion on a non-technical level.

In deciding whether or not the student should be held responsible for a specific piece of information, ask the question "Will this knowledge assist him directly in solving field problems?" Unless the answer is decidedly "yes", the value of the material should be questioned before being included in the course. If it helps only indirectly, it should be deferred until the new man has had time to assimilate the information which can be applied directly to his job duties. The point occasionally raised that a student's knowledge of obscure technical points would do him no harm in servicing appliances is true. The point overlooked, however, is that by injecting those points in the basic training course, the student's attention is being diverted by minutia which can be applied only occasionally. It is desirable, therefore, to include only material which can be directly related to the job and applied by the student soon after he has acquired the information.

Gas Properties

A general knowledge of the properties of the gas distributed by the particular utility should be given at least a brief treatment during this phase of training. General points such as the percentage of the various hydrocarbons in the gas, specific gravity, the toxic or non-toxic characteristics of the fuel, the Btu. content, etc., should be discussed. Much of this subject can be discussed on a rather broad basis. For instance, it is not always desirable for a student to remember the actual figure designating the specific gravity of the gas but it is important that he know whether it is heavier or lighter than air which would be useful to him in adjustments such as pilot location and in leakage investigation. The discussion relating to Btu. values is an exception because the specific number of heat units in a given quantity of gas must be known in order to determine the correct input for a given appliance. The alignment chart shown in Fig. 1 is helpful in covering this subject with new people. A similar chart involving lower input values is helpful in calculating leakage registration in conjunction with meter spot testing. Alternate methods involving simple arithmetic are offered, but the use of the chart seems preferable in cases where it can be applied.

Combustion

Combustion is the most important subject to be covered in the earlier stages of training because it relates so directly to all of the appliances that a serviceman is called upon to adjust. Considerable time should be spent to assure complete understanding of the various factors relating to combustion of gas, for without this knowledge students are handicapped when various types of appliances are discussed later in the course.

A motion picture dealing with petroleum fires, developed by and available through the Petroleum Industry, contains approximately 25 minutes of introductory material relating to the fundamentals of combustion as applied to petroleum products. Although the picture is designed to prevent fires involving liquid petroleum products, the importance of the three conditions necessary for combustion is well demonstrated and can be applied to a gaseous fuel. The fact that all ordinary fuels must be in a gaseous or vapor state before they can be burned is shown through the use of the laboratory equipment. Combustible and explosive limits are clearly demonstrated and explained with animated drawings. Specific gravity is demonstrated by controlling the flow of a heavy vapor to a source of ignition. The variation in kindling temperatures of various fuels is illustrated by showing how a hot soldering iron which will not ignite gasoline will ignite paper that in turn causes gasoline to burst into flames. Despite the fact that all of the film cannot be directly applied to the serviceman's job, it provides a valuable background for classroom discussion to bring out the fundamentals necessary for satisfactory combustion of gas.

Since the luminous flame is the simplest type of gas flame to explain, it is usually discussed before considering the blue flame. The chemical reaction taking place is briefly outlined with reference to items such as combustion air, the effect of flame inpingement and the reason for the luminous quality of the flame.

After the student understands the fundamentals of combustion relating to the luminous flame, the blue flame is described pointing out the difference between the two. In discussing the blue flame, the drawing shown in Fig. 2 is used to identify the various zones of combustion which are present in a blue flame. An ordinary laboratory burner is used to advantage in demonstrating the effects of excessive and insufficient primary air. The point is made that increase in primary air merely shortens the flame so that complete combustion can take place in a reduced space. A wire mesh screen is used in conjunction with the burner to show the hottest and coolest spots in the flame.

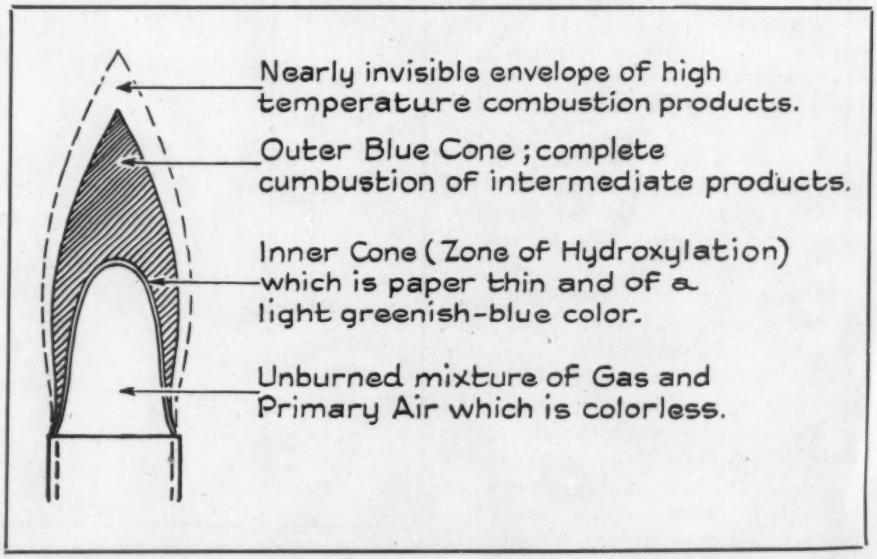

Nearly invisible envelope of high temperature combustion products.
Outer Blue Cone; complete cumbustion of intermediate products.
Inner Cone (Zone of Hydroxylation) which is paper thin and of a light greenish-blue color.
Unburned mixture of Gas and Primary Air which is colorless.

FIG. 2. Schematic drawing of a gas flame illustrating the different combustion zones.

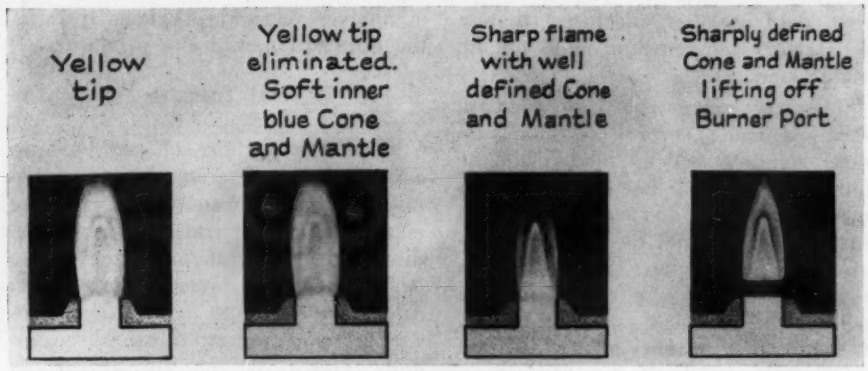

Yellow tip
Yellow tip eliminated. Soft inner blue Cone and Mantle
Sharp flame with well defined Cone and Mantle
Sharply defined Cone and Mantle lifting off Burner Port

FIG. 3. Examples of various types of flames.

The problem of establishing an acceptable range of flame adjustments is complicated by the fact that all servicemen have their individual preferences in flame adjustments. It was found that when a number of servicemen were asked to produce a perfect flame on a particular burner, practically all of them would differ slightly in the flame left. Those differences, however, were found to be rather slight and fell well within the range which has been termed "The range of satisfactory combustion". That range was established on the "soft side" by adjusting the burner until a yellow tip appears, then opening the air shutter until the flame is completely blue. On the other extreme, the air shutter is opened until the flame lifts off the burner port and then closes until the flame settles back on the port opening. Although there are specific appliances where the "soft" or "sharp" flame may be desirable, for general use, any flame between the two extremes of the yellow tip or a lifting flame is considered within the acceptable range. Examples of the various types of flames illustrated in Fig. 3 are demonstrated and reproduced by students during the classroom sessions.

The chemistry of combustion is considered sufficient to form a background for discussing unsatisfactory flame characteristics and the various causes which result in incomplete combustion. Lint in the air shutter, small "jacks" or other obstructions in the burner, flame impingement on cold surface and insufficient primary and secondary air are demonstrated to show how fundamental principles of combustion are being violated. Smothering conditions that result from improper venting of flue products are discussed and field conditions (such as steel wool in oven vents) are related to the laboratory experiments which are used to present this phase of the training.

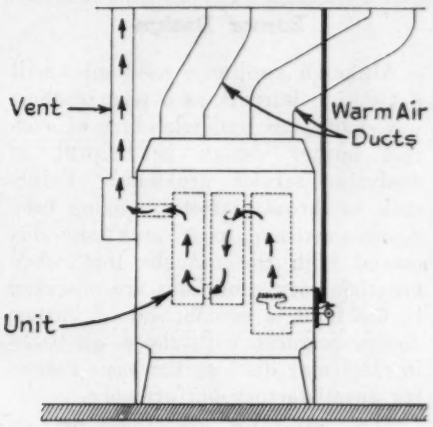


FIG. 4. How products of combustion travel through appliance ducts to reach vent.

Venting

After the student thoroughly understands the principles of combustion the next logical step is to discuss the disposal of combustion products. This automatically ushers in the subject of venting. Drawings showing how products of combustion travel through the appliance ducts are used to familiarize the student with the paths followed by combustion products to reach the vent. Fig. 4 is an example of the drawings used to cover this point. The importance of a downdraft diverter is pointed out and emphasized as being an integral part of the appliance. The theory of gravity venting is related to the U-gage or manometer, which is already understood by the student. The drawing shown in Fig. 5 is one of several that has proven helpful in teaching students what makes a vent operate.

At the conclusion of the venting lecture, the following simple test is conducted. Training props and appliances are used to demonstrate the major points treated in the discussion.

(1) Allow the appliances to reach operating temperature while making a cursory examination of the vent based on the classroom discussion; i.e. draft diverter, vent outlet, vent cap, height of vent, prevailing winds, etc.

(2) Place a match which has recently been extinguished near the edge of the draft diverter and observe the action of the smoke. If the smoke is not drawn into the vent, flue gas products may be spilling out of the diverter. If the smoke draws into the diverter, the vent is drawing satisfactorily.

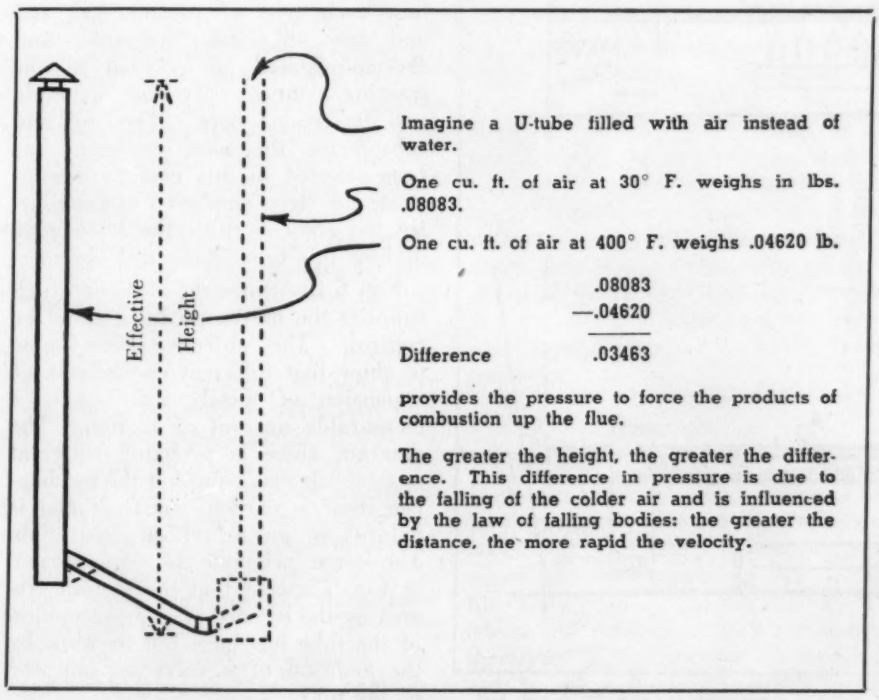

Effective Height
Imagine a U-tube filled with air instead of water.
One cu. ft. of air at 30° F. weighs in lbs. .08083.
One cu. ft. of air at 400° F. weighs .04620 lb.
.08083
—.04620
Difference .03463
provides the pressure to force the products of combustion up the flue.
The greater the height, the greater the difference. This difference in pressure is due to the falling of the colder air and is influenced by the law of falling bodies: the greater the distance, the more rapid the velocity.

FIG. 5. Theory of gravity venting.

Burner Design

Although appliance mechanics will not design burners as a part of their job duties, an understanding of correct burner design is helpful in analyzing service problems. Points such as throat diameter, mixing tube dimensions and port area are discussed with the thought that when unsatisfactory conditions are observed in the field, a comparison of burner design features with those discussed in class may disclose the basic reason for unsatisfactory performance.

The following experience of an appliance serviceman illustrates how a knowledge of burner design and performance can be applied in the solution of field problems:

A poultryman had constructed a hot water chicken brooder using a conventional instantaneous water heater coil, case, and burner. An ordinary brooder thermostat installed in the gas line was intended to hold the temperature at the desired point. The first cold weather disclosed that a satisfactory temperature could not be maintained.

The serviceman who was called on the job made several recommendations, one of which, related to the burner. He knew that the instantaneous water heater burner used in that installation was not designed to operate at a low input. He also knew that the soot on the coils could be traced to the flame flashing back through the burner to the orifice, sooting the inside of the mixer head which in turn resulted in an unsatisfactory burner flame. Without a knowledge of burner design, the man might have overlooked one of the important points in solving the complaint. It is cases like the one cited above that demonstrate the value of general knowledge relating to gas appliances. Odd pieces of equipment are encountered too infrequently for servicemen to accumulate experience in working on these specific appliances so that they must be prepared to analyze unusual problems through the application of basic principles.

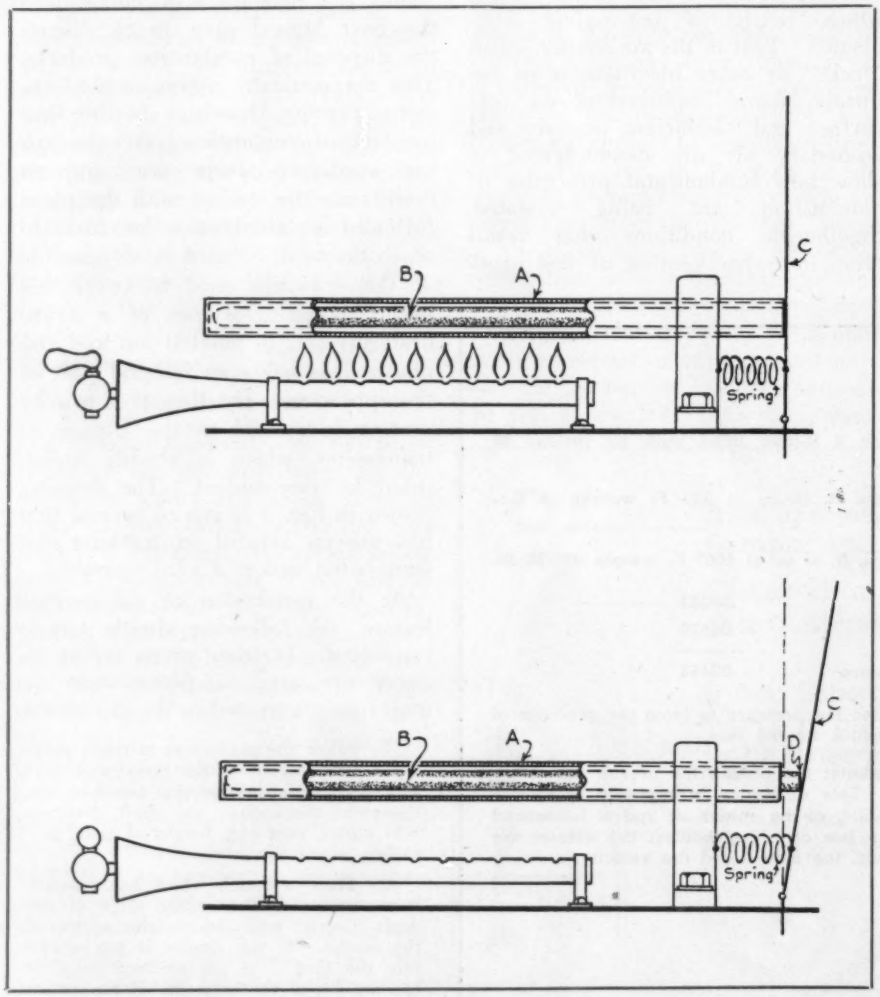


FIG. 6. Picturization of the elements which supply movement to operate a rod and tube control. Above: tube hot and extended; below: tube cool and contracted.

Heat Transfer

Since the purpose of gas burning equipment is to transfer heat from one medium to another, the three methods of heat transfer should be discussed in this section of the course dealing with fundamental principles. The three methods, conduction, convection, and radiation are discussed and related to specific appliances which will be encountered in customers' homes.

Fundamentals of Controls

The countless makes and models of controls used on gas appliances often present a discouraging obstacle to new employees who are preparing for the job of appliance mechanic. Since most domestic controls operate on one of a few basic principles with minor variations applied by the individual manufacturer, the task of understanding and adjusting the numerous models encountered is not as difficult as it may appear to the untrained student. It helps considerably if the fact that all controls operate on a few simple principles can be made clear early in training because the student can then more readily understand the operation of the various types of controls encountered on ranges, water heaters, refrigerators, or heating equipment. As space will not permit a detailed description of how each type of control, i.e., rod and tube, bi-metal, hydraulic, and thermo-magnetic, is covered in the training course, only one example will be treated here. The rod and tube being the most common, has been selected in this case to demonstrate the steps employed to familiarize the students with the knowledge of how this type of control operates,

Fig. 6 illustrates the element which supplies the movement to operate the control. The objective here being to show that different co-efficients of expansion of metals will supply a measurable amount of motion. The diagram alone is probably sufficient to establish that point but the mechanism itself is easy to construct and is helpful in an actual demonstration. The same principle is demonstrated in Fig. 7 except that the motion created by the expansion and contraction of the tube has been put to work by the addition of a valve on one end of the tube.

Fig. 8 completes the elementary

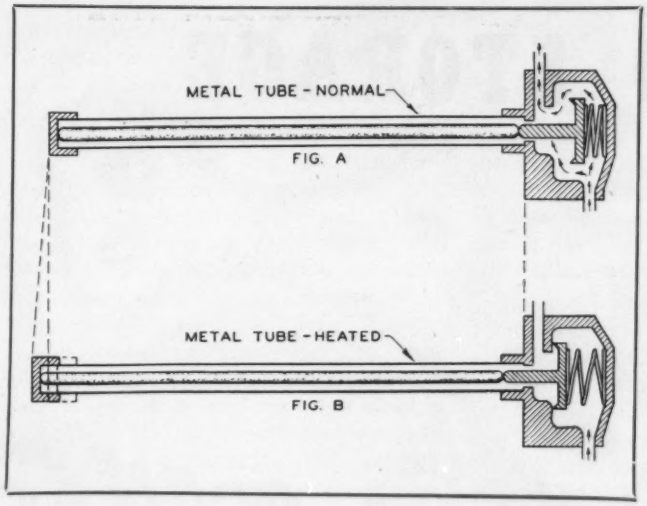


FIG. 7.

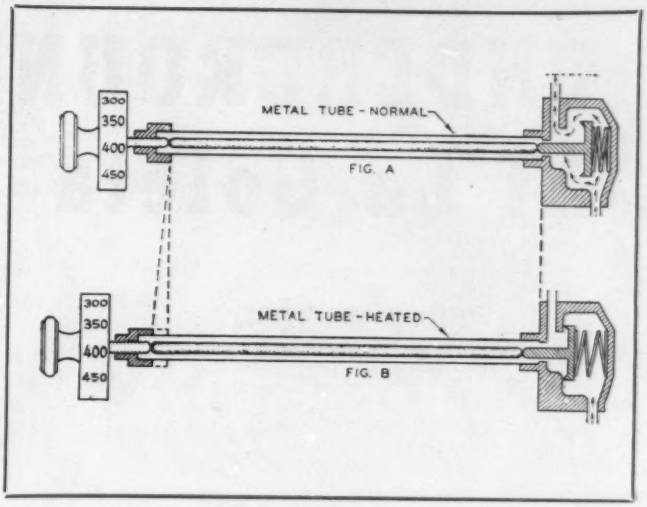


FIG. 8.

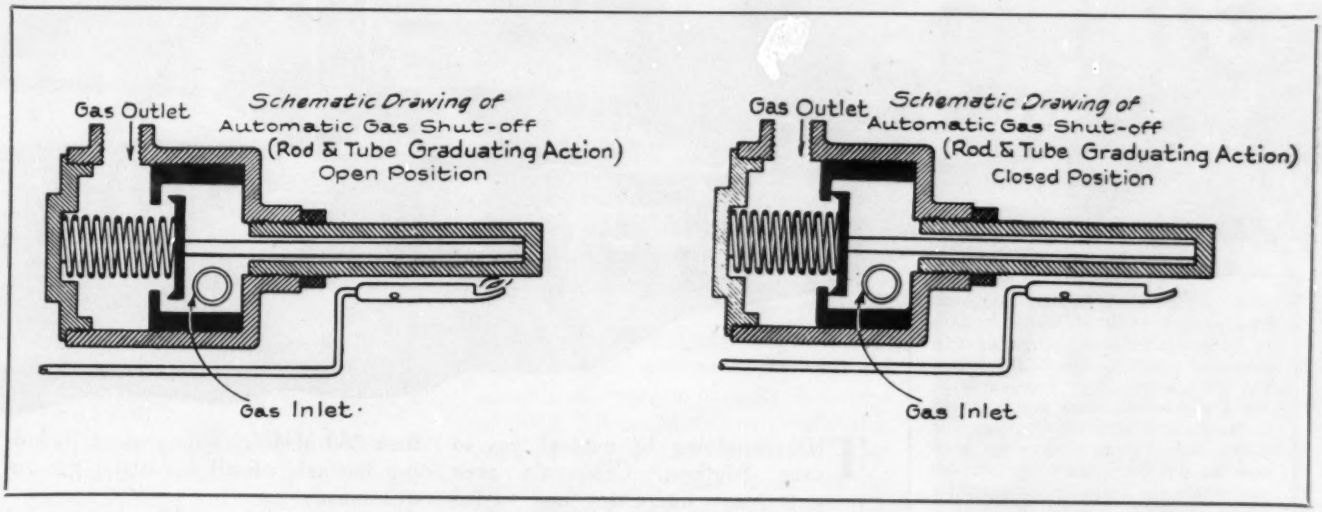


FIG. 9.

steps showing the development of the rod and tube control by the application of a dial which makes it possible to regulate the temperature at which the valve closes. The application of this principle to automatic shut-off devices is easily understood by students once they understand the fundamental principles underlying the operation of control utilizing the rod and tube element.

Fig. 9 is one of several drawings in which the position of the valve has been reversed to illustrate how the rod and tube element is utilized in an automatic shut-off device. Individual manufacturers' variations of this basic principle such as quick-acting valves, snap action valves and other refinements can be applied to these basic drawings and understood readily by trainees.

Bi-metal controls, hydraulic controls, diaphragm valve controls, and thermo-magnetic type controls are given similar treatment using schematic drawings which appear to be the best medium for covering fundamental principles. This type of drawing does not confuse the student with details of construction but can be designed to focus attention on the principle alone which is the subject under discussion at this point. Later, detail drawings of specific controls and the controls themselves are helpful props in discussing service procedures.

Summary

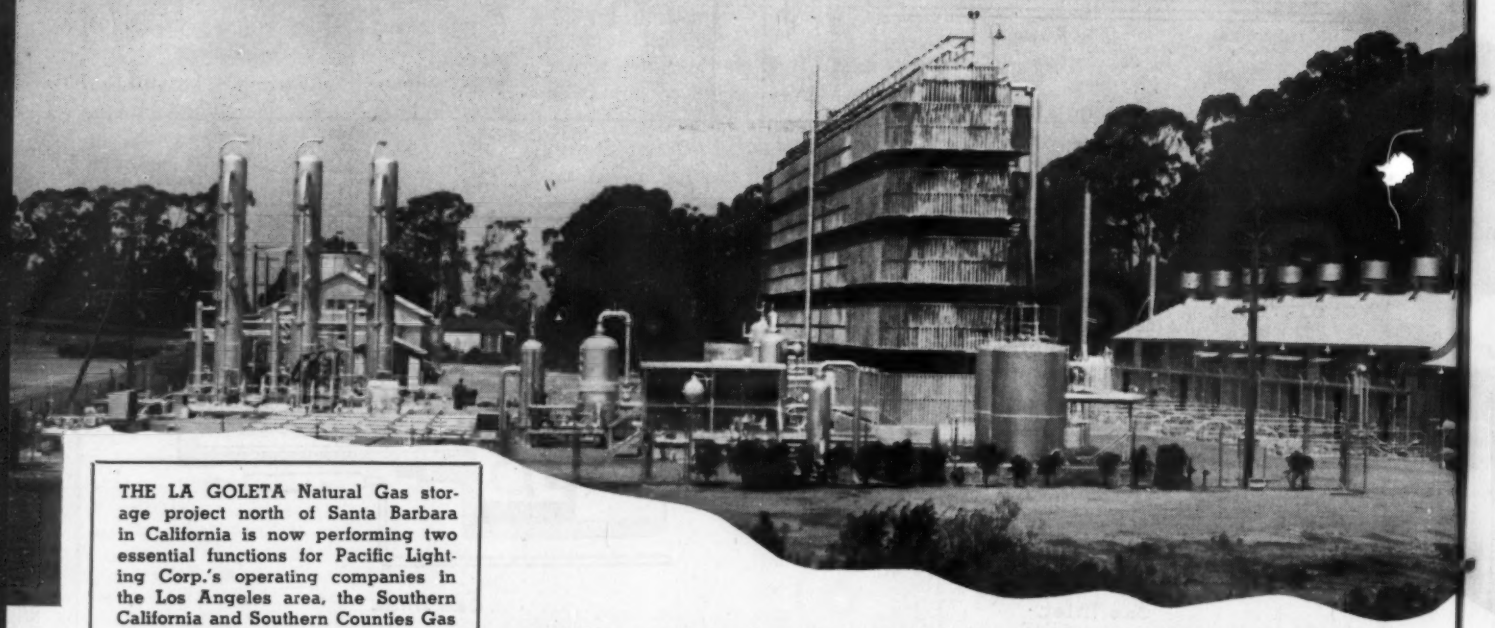
This type of training is probably as important as any of the subjects to be discussed in this series of articles because it offers the foundation upon which the new employee can build his knowledge of individual appliances and controls. It is fortunate, therefore, that this form of training can be successfully conducted on a modest scale making it available to small organizations. Drawings can be used in many cases as a substitute for actual controls. The few controls necessary are easily obtainable and can be used repeatedly, Specialized props can be fabricated from descarded controls and need not represent an extensive investment.

Even though classroom training involving ranges, water heaters, refrigerators, and heating equipment would not be practical for some companies, this basic training applied in conjunction with field training accelerates "on the job" learning because field observations are more meaningful when the fundamentals are understood.

(This is the fourth in a series of articles by Mr. Westmoreland on the Training of Appliance Servicemen. The fifth in this series, covering the Gas Range will appear in the November issue of GAS).

UNDERGROUND STORAGE At La Goleta

By RAYMOND W. TODD
Pacific Lighting Corporation



THE LA GOLETA Natural Gas storage project north of Santa Barbara in California is now performing two essential functions for Pacific Lighting Corp.'s operating companies in the Los Angeles area, the Southern California and Southern Counties Gas Companies. First, it provides storage during the summer for surplus gas which can be made available for winter peaks. Second, it offers a means of equating daily and hourly fluctuating loads. Mr. Todd in this

R. W. Todd

article sums up and discusses generally the reason for the project, the methods and equipment used in its development, the results achieved by the utilities in strengthening their load factors. This is the third in a series which have been published in GAS on the Goleta project. Technical papers describing the dehydration plant and process by R. J. HULL of Pacific Lighting Corp. and N. K. SENATOROFF of Southern Counties Gas Co., appeared in the May and July issues respectively. Mr. Todd's paper was presented before the August meeting of the California Natural Gasoline Association.

THE supplying of natural gas to the Southern California area presents many interesting and varied problems. In the first place, the gas companies (Southern California and Southern Counties Gas Companies) are almost wholly dependent upon oil well gas as a primary source of gas for distribution. Inasmuch as the production of oil well gas is dependent upon the production of oil, the supply of gas is more or less fixed at a constant rate. The amount of oil well gas available for consumption by customers in Southern California is approximately 450 MMcf. daily. Normally this production of oil well gas exceeds the market requirements during the summer months, or off peak period, but fails to meet such requirements during the winter months, or peak period. For example, on February 28, 1945, the gas companies experienced a day of very heavy demand, which resulted in the distribution of 617 MMcf. of gas. This load was all firm load, inasmuch as practically all surplus rate curtailable industrial load had been shut off. During this summer, we have experienced days on which our total actual delivery was less than 350 MMcf. This amount including the sale of all industrial gas requirements.

Considering these maximum and minimum load requirements with industrial consumers, off in one instance and on in the other, it is obvious that some means of equating the winter and summer load factor must be provided. The partial answer to this problem has been underground storage of gas during the summer and its subsequently withdrawal and use during the winter. However, before discussing the problems in connection with underground storage of gas, let us consider another supply problem with which the gas companies are constantly confronted. In addition to having to equate a winter and summer load, it is also necessary to provide facilities for equating the daily load. In Southern California we often have daily temperature variations as high as 40°. Such temperature fluctuations naturally result in a tremendous variation in gas demand. For example, referring back to our peak day of last February, the maximum hourly delivery at a daily rate was 852 MMcf., while the minimum hourly delivery at a daily rate was

234 MMcf.—a ratio of almost 4 to 1 between maximum and minimum.

In the past such daily fluctuations have been met through the use of dry gas production, above ground storage, pipeline pack and gas manufacturing operations. However, with the increase in firm load demand, it has been impossible to fully equate the load by these means, and it has been necessary to utilize underground storage to alleviate these daily fluctuations. We have had many instances during the past year when gas would be injected in underground storage during the night or off peak periods and withdrawn during the day or peak period, all within a 24-hour period.

During the maximum rate of delivery of 842 MMcf. of gas on our peak day last winter, gas was withdrawn from underground storage at a rate of 193 MMcf. per 24 hours with 150 MMcf. of this amount of gas being withdrawn from the La Goleta Field.

From the above load conditions, it is, therefore, apparent that the underground storage projects perform two functions:

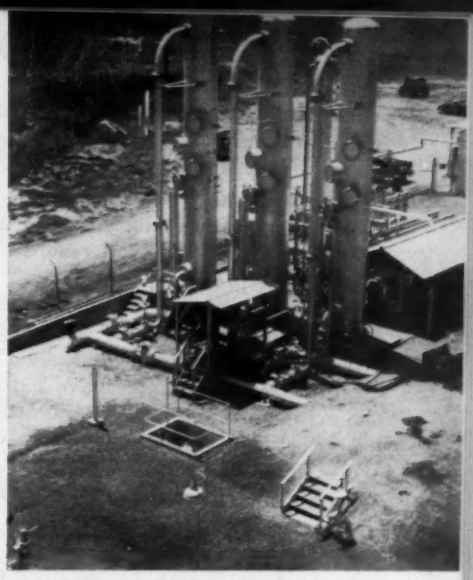
1. Provide means of storage of surplus natural gas during the summer period and making this gas available during winter; and
2. To equate daily and hourly fluctuating loads.

Underground structures suitable for gas storage have been sought by the gas companies for many years. Tests have been made on various structures, the majority of which did not prove satisfactory. Some of the conditions which must be taken into consideration in deciding if a structure will be suitable for gas storage are listed in Table 1.

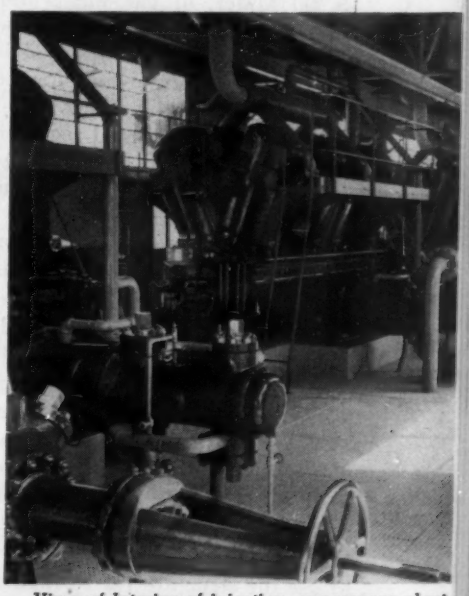
A storage structure need not necessarily meet all of the above conditions, but each must be taken into consideration when studying possibilities of gas storage. In most instances, the problem of ownership or rights in the structure, or surface rights, are so complicated that it eliminates the use of the structure for gas storage without considering the other factors.

There are at present several underground gas storage reservoirs being utilized in connection with the conserving and supplying of natural gas for Southern California. The largest and most important of these underground storage projects is in the La Goleta field.

Before going into the details of the La Goleta storage project, I believe it would be advisable to briefly review the history of the La Goleta field. The La Goleta field is located on the Coast, approximately eight miles north of the city of Santa Barbara. The field was originally discovered by one of the major oil companies in 1929. The formation in which the storage operations are carried on is a Vaqueros sandstone and is approximately 4300 ft. below sea level. The Vaqueros zone has an average thickness of some 300 ft. and is considered ideal for gas storage operations, inasmuch as it has a porosity in excess of 20%. Between the originally discovered well in 1929 and 1935, four additional wells were completed in the structure. All of these wells, including the original well, were drilled by major oil companies endeavoring to strike an oil zone, and were not drilled for the production of natural gas. These wells and other wells drilled outside of the limits of the



View of contractor gas piping

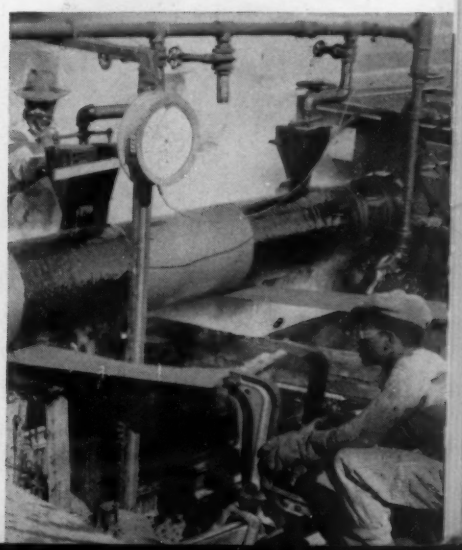


View of Interior of injection compressor plant

TABLE. 1. STRUCTURE CONDITIONS NECESSARY FOR UNDERGROUND STORAGE OF GAS

1. The closures of the structure must be such that there is reasonable assurance that the gas injected will be recovered.
2. Water encroachment must not be at a rate which would interfere with the use of the structure.
3. The structure must be of sufficient capacity to warrant the necessary capital expenditure for injection and withdrawal facilities.
4. The permeability of the sand in the reservoir must be such that gas can be readily injected and withdrawn at high rates over an extended period.
5. The sand in the structure must be reasonably free of liquids which might be picked up by the injected gas and present serious removal problems.
6. The structure must be at a location which would make the transmission of gas to the distribution locations practical.
7. The necessary right to use the structure for storage purposes must be obtainable from the oil companies and/or those holding such rights.

Pipe wrapping in yard at Moor Park, 18-inch pipe



field area have defined the productive Vaqueros zone as covering an area of approximately 295 acres.

Unfortunately, the original well head pressure was not observed in the discovery well, however, record of the well head pressure was noted as 1700 psig. after several months of testing. This pressure has been considered to be quite accurate, inasmuch as fields of this type generally have a formation pressure equal to the hydrostatic head of salt water, which at a depth of 4300 ft. would be 1904 psig., which pressure corresponds to a surface pressure of approximately 1705 psig.

In order to utilize the gas produced in the La Goleta field, pipeline facilities were installed in 1931 which would allow the withdrawal of gas for use in the Los Angeles area. This withdrawal continued for a period of years up to 1939, during which time 15,300 MMcf. of gas was withdrawn from the structure. The production of this amount of gas resulted in the well head pressure being lowered to approximately 1450 psig. In 1939, the increase in firm load requirements and the necessity of equating the summer and winter loads, prompted the Pacific Lighting Corp. to start tests on the structure to determine the feasibility of utilizing the structure for dry gas storage. The necessary test facilities were installed and during the summer of 1939, several hundred million cu. ft. of gas were injected and the resulting pressures observed. The results of these tests indicated that there was no question but what the structure was adaptable for underground storage, and we proceeded to acquire the necessary rights to use the structure for storage operations. As much of the property as possible was purchased in fee, while on the remaining property all gas between the bottom of the Vaqueros zone and the surface was purchased in place, along with the right to use the structure for storage purposes. The five wells which had been drilled in the field by the oil companies were purchased from the oil companies for use as withdrawal and injection wells.

The pipeline facilities which were originally installed had a capacity out of the La Goleta field of 65 MMcf. The original wells drilled by the oil companies had a combined production capacity of approximately 100 MMcf., when the wells were operated on the basis of not exceeding 500 lbs. draw-down during production. This maximum draw-down pressure was established in order to eliminate a high sand face velocity.

In order to provide sufficient injection capacity to inject the required volume of gas during the summer time to meet the winter withdrawal from La Goleta, Pacific Lighting Corp., in 1941, completed the installation of an injection plant, consisting of four 600-hp and one 300-hp gas engine driven compressor units. This plant had a total injection capacity of approximately 30 MMcf. per day. The compressor plant was designed and constructed to operate at a maximum discharge pressure of 2500 psig. and an intake pressure of 350 lbs. Gas for injection being supplied from oil fields in the coastal area.

The operation of the field and its facilities during 1941, 1942 and 1943 verified the results of the injection test made in 1939, and proved beyond a doubt that the La Goleta field was suitable for gas storage. In 1943, the gas companies were confronted with the program of supplying additional gas during the winter periods, and providing a means of conserving increased amounts of natural gas during the summer months which were available as a result of the increased oil production. In view of the satisfactory operations at La Goleta, the La Goleta field was selected as the location for the additional storage operations.

The additional gas necessary to meet the winter load requirements and the capacity for utilizing summer excess gas established the operations of the La Goleta storage project as follows:

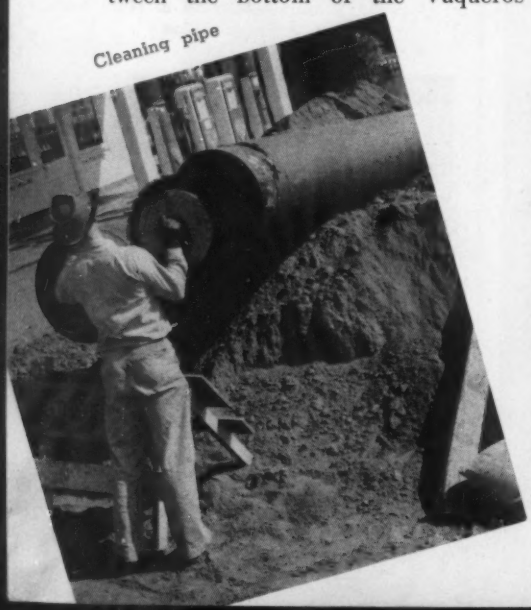
Withdrawal capacity	179 MMcf
Injection capacity	65 MMcf

In order to meet these requirements, the installations as listed in Table 2 were agreed upon.

The proposed pipeline from La Goleta to Ventura was to be installed by Southern Counties Gas Co., and was planned as a 1 in. line to operate at 1000 psig. The line from Ventura to Los Angeles was an 18 in. line which was designed to operate a maximum pressure of 783 psig. The lines were planned to operate at these higher pressures in order that the field pressure at La Goleta could be utilized and the gas transported from La Goleta to Los Angeles without compression.

The installation of a dehydration plant was necessary, inasmuch as the original pipeline from the field operated at a maximum pressure of 460 psig. and condensate could be removed by cooling the gas through expansion from field pressure down to 460 psig. However, with the proposed pipeline facilities operating at 1000 psig. pressure, there was not sufficient expansion from field pressure to provide enough cooling to remove the water. In addition to this, considerable difficulty had been experienced in maintaining accurate control over the cooling in order not to cool to a point where gas hydrates would form.

To provide the facilities to meet the required injection capacity of 65 MMcf., Pacific Lighting Corp. in-



Cleaning pipe

TABLE 2. INSTALLATIONS REQUIRED FOR LA GOLETA PROJECT

1. Install a high pressure transmission pipeline from La Goleta to the Los Angeles area.
2. Install 1000 psig. compression equipment at Ventura, in order to provide gas for injection at La Goleta during the summer period.
3. Install additional injection facilities at La Goleta, so as to increase the injection capacity of the plant from 30 MMcf to 65 MMcf per day.
4. Install dehydration facilities at La Goleta for removal of water from the gas, prior to its being delivered into the high pressure pipeline facilities.
5. Drill two additional wells in the La Goleta field in order to provide sufficient withdrawal and injection capacity.

stalled three additional 600 hp units. These units along with those in the original plant resulted in the plant having a total of 4700 hp. The three new units were installed so as to operate with an intake from the new 1000 lb line, thereby, utilizing this line to its fullest efficiency.

Two new wells to be drilled were located with respect to the existing wells so as to provide as uniform spacing on the structure as possible. A portion of the ground surface in the field area is at present occupied by the Marine Air Corps Base. Inasmuch as the proposed location of the wells came within the air strip, it was necessary to off-set the well derricks approximately 1500 ft. and slant drill by means of whip-stocking to the desired bottom hole location. Standard drilling procedures were followed in the drilling of the wells down to the top of the structure. Upon reaching the top of the structure 8⅝ in. casing was set and cemented in place. Following the installation of the 8⅝ in. casing, the wells were drilled ahead into the formation sand. Drilling in the structure was planned so that the drilling mud stood in the hole as short a time as possible, in order to eliminate sealing the sand with mud.

The first well, Miller No. 1, encountered 400 ft. of very coarse sand, while the second well, Miller No. 2, was completed in 300 ft. of finer sand. Following drilling through the sand an electrolog was run on each well and the extent and location of liner perforations were determined from these logs after which the 6⅝ in. perforated liner was hung. Two inch tubing was then hung in the well to within 25 ft. of the bottom, in order to remove any liquids which might accumulate in the well. The wells were then brought into production and produced open until they had cleaned up.

Production tests were run on each of the wells before connecting them into the field system. Miller No. 1 produced at a rate of 145.4 MMcf of gas per day through the casing and Miller No. 2 produced at a rate of 128.1 MMcf. per day. The production rate on Miller No. 1 of 145.4 MMcf., to our knowledge is the highest rate of gas production for a single well under control in the State of California.

Our experience in operating the field as a gas storage field during the past four years has revealed many interesting facts. Continuous pressure checks are made on the various wells in the field by the means of dead weight testers. These pressures, along with the volumes of gas injected and withdrawn, show that approximately 30 MMcf. of gas is required to change the pressure in the structure one pound within our present operating range. During the past year the highest pressure reached was 1765 psig. well head, some 50 psig. above original pressure.

Reducing the pressure of the structure below the original structural pressure results in a loss in reservoir capacity which is assumed to be attributed to water encroachment. Calculations show this loss to be at an average rate of one-half of one per cent per year per 100 lbs pressure below the original structural pressure. To date this accumulated loss of reservoir capacity equals approximately 7.82%. Inasmuch as continuing operations of the structure below the original structual pressure would have resulted in serious loss in reservoir capacity, our first objective was to inject sufficient gas to restore the original structural pressure.

In order to prevent further water encroachment our plans call for operating the structure so that the average structural pressure will not be below the original well head pressure of 1720 psig. However, it is difficult to predict the action of the structure when increasing the pressure above the original structural pressure. This year we expect to increase the structural pressure approximately 100 lbs. above the original pressure and observe the results.

Future plans call for injecting and withdrawing 10,000 MMcf. per year. Such a cycle will result in a pressure fluctuation in the structure of approximately 300 lbs. Assuming that the edge water can be displaced by increasing the pressure above the original pressure at the same rate at which encroachment took place when pressures were below the original pressure, then it would be necessary to increase the pressure to approximately 150 lbs. above the original pressure.

The use of underground storage for natural gas is not new, as there are fields in the United States where this operation has been carried on as far back as 1915. However, in the last few years there has been a decided increase in the number of fields utilized for this means of conserving gas and equating loads.

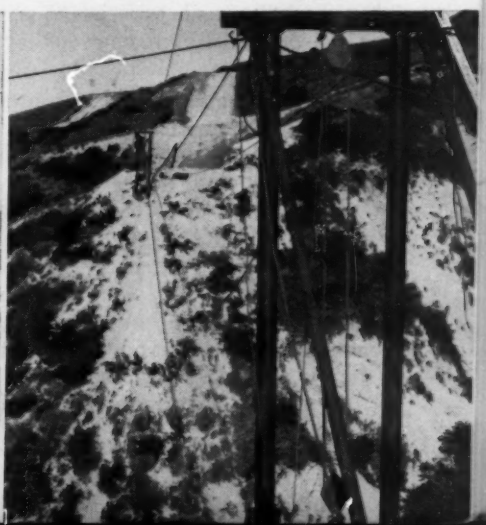
E. G. Dahlgren, of the Interstate Oil Compact Commissoin, reported in 1944* that there were more than 55 storage projects in operation in the United States, with a total withdrawal capacity of some 750 MMcf per day. In 1945, the number of storage projects had increased to more than 65. It is hoped that sufficient gas storage projects will be placed in operation in the United States so as to conserve as much as possible of our natural gas.

Underground Storage of Gas, E. G. Dahlgren, GAS, July, 1944 (29); Aug. 1944 (43).

"Sheep's foot" wheel mounted on side-arm "cat" used in backfilling on 16-inch pipeline north of Carpinteria

Production test in Miller No. 1 well

Pulling span on 16-inch pipeline across ravine northwest of Ventura



Promotional Notes and Notions

By STANLEY JENKS

Basic Sales Policy

Nobody, of course, questions the fact that gas appliances must be sold to hold present loads and build new ones. And, the better the appliance, the better the load-building job.

This page has always protested the efforts of some (too many) utilities to "hog" the local gas appliance market. It is a shortsighted, line-of-least-resistance, cake-and-penny policy, because it inevitably competes with those manufacturers and dealers whose cooperation could be so mutually helpful.

The British Columbia Electric Railway Co., a well-managed Canadian combination utility, according to W. C. Mainwaring, vice president in charge of general sales, has recently *modernized* its appliance sales policies.

From now on, according to Mr. Mainwaring, the company will restrict its direct appliance selling to those items the uses for which do not have customer acceptance. In other words, his company will do the pioneering and leave the accepted merchandise—based on saturations, I assume—to other retail outlets.

Load-building bonuses, in the form of advertising allowances, are to be paid to appliance dealers for sales, and an agreement made for the turning in to the utility for scrapping all appliances traded in, so that the dealer is (1) in a favorable position to do a merchandising job and (2) to improve the utility's service by getting obsolete appliances off the lines. Undoubtedly, this change will cost the utility money at first, but in the long run it must inevitably prove an excellent investment in sound promotion, because primarily there will be more people (manufacturers and dealers) with a dollar and cents interest in the growth of the company.

Salesman's "Take Home"

Any man who has rung doorbells or done outside appliance selling knows that it is a tough, exacting job. Training and experience are necessary, but the one indispensable ingredient in a good appliance salesman is I.F. (pronounced "Guts").

Any sales manager also knows that such men are valuable and that they do not do this work solely because the doctor ordered them to work outside in the summer heats and the winter snows. They are after the dough, and, brother, the better the salesman, the more they are after it.

In the old days, when the gas industry was desperate for domestic business, and when nobody else but the gas company could *afford* to sell gas appliances, straight commission compensation got results fast. What it did to public relations is another story. Anyway, the system of turning the boys loose under high, wide, and handsome conditions can no longer be justified, because it is unsuitable to meet today's needs for representatives whose primary job is to sell gas service and keep it sold.

What is a sound salesman's compensation plan? It is based on the fundamental that the salesman's main purpose is to sell gas service through appliances. However, if the salesman is really on the job, he is protecting the present load. The A.G.A. Postwar Planning Committee in Report No. 4 cites the case of a gas company which analyzed its new business expense and found that it was spending $1.00 per year per customer to hold old business. The salesman, who does so much of this work—if he doesn't, he should—is entitled to some pay for his efforts, although nary an appliance sale results from them.

With new business expense normally approximately 3.0% of gross revenue, a small fixed percentage of this could be justifiably allocated to residential salesmen's compensation for holding business along these lines. For example, suppose a salesman's territory covers 5000 residential customers averaging $36.00 revenue per year. The annual gross operating revenue from this territory is $180,000. Pay the salesman—he's a good man, remember—1.0% as a basic salary, that is, $1800 a year. That constitutes the main inducement for him to go out loyally and courageously to fight the gas company's battles on the front where it really counts—in the customer's home. Next, study the load characteristics of each appliance, and pay him a commensurate bonus on all approved net additions to the lines, whether made by the company or a dealer. Who cares, so long as we get the load?

Such a plan will encourage honest and constructive effort at a cost the gas company can afford, and it will once and for all take the gas company out of the doghouse into which it climbs every time it becomes another dog in the dog-eat-dog world of competitive selling.

National Advertising Copy

The three advertising campaigns starting this month are considerably improved over previous efforts. At last, we are beginning to sell gas service applied to specific kitchen needs instead of draughty dreams for culinary cuties.

Those gas range manufacturers who are advertising in the national consumer publications have a far more realistic approach, and in consequence are doing a better job. Naturally, they can be far less general and more realistic as they emphasize the special merits of their own products, but in this respect the A.G.A. copywriters are not exactly hand-tied. It would seem as though the "CP" range specifications alone, translated into terms of customer interest, ought to be a cakewalk for any competent advertising writer who knows what the industry needs.

CORROSION AND PROTECTION

Of Buried Metallic Structures

Compiled and Abstracted by GUY CORFIELD, Technical Editor, GAS

Current Density Related to Current Distribution

HARRY C. GEAR, engineering division, Midwest Engineering & Tool Co., Neodesha, Kans., formerly was associated with Lone Star Gas Co., Dallas. This report was first presented before the Bureau of Standards Corrosion Conference.

It has been assumed by the writer that a measurement of current density is a criterion by which the degree of corrosion mitigation can be determined. This report presents a method of correlating potential measurements (IR drop) on consecutive uniform intervals of bare pipe line with the total current drained and the distance from the point of drainage. The relation of current distribution to current density is expressed by the empirical relation derived from an analysis of the line current flowing under a condition of forced drainage. This method of analysis introduces a rational solution of the current requirements.

Test Procedure

THE pipe line to be investigated must be exposed to a system of forced electrical drainage so that the distribution of a known amount of current can be determined. The pipe line is explored by the usual method of measuring IR drops along consecutive uniform intervals[a]. In making this investigation any convenient contact interval that is suitable to the range of the voltmeter or potentiometer available may be chosen. Starting at the negative return consecutive IR drops are measured in each direction along the line until the section under investigation has been covered.

The observed readings are then plotted on semilog coordinate graph paper. IR drops measured in millivolts are plotted on the logarithmic ordinates corresponding with the distance measured in feet to the mid-point of the contact interval.

The data covered by this report was taken from a recent survey conducted on both bonded cast iron and welded steel gas mains. While the results of the investigation of only a few sections of line are included herein, these data are typical of results that would be obtained as a result of a similar investigation on cross-country lines.

Interpretation of Data

If reference is made to the various graphs included herein, it will be noted that the plotting of these data indicates straight line distribution; except in situations where (a) the conductivity of the soil is not uniform and (b) where the forced drainage current is so small that it will be materially affected by the normal soil or long line currents.

In situations where the magnitude of the soil changes, this circumstance will be reflected by a change in the slope of the current distribution curve irrespective of the initial current drained and of the distance from the drain. (Fig. 1.).

In situations where the magnitude of the current imposed under forced drainage is materially affected by the influence of earth or long line current this circumstance will likewise be reflected by a departure from straight line distribution. (Figs. 2 and 3).

However, the extent of this condition is dependent upon the current density existing at a given location which, in turn, is a function of the initial magnitude of the current drainage and the distance from the drainage point.

Obviously the situation discussed under item (b) will have a universal application and the divergence from straight line distribution arising from

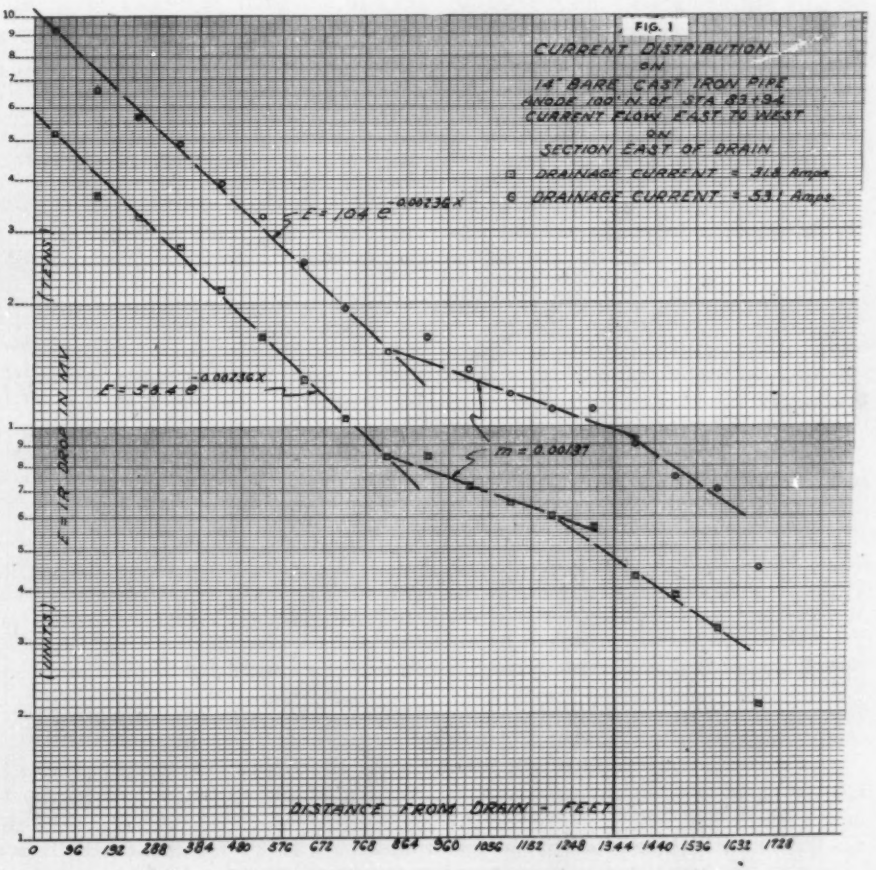


FIG. 1
CURRENT DISTRIBUTION
ON
14" BARE CAST IRON PIPE
ANODE 100' N. OF STA 83+34
CURRENT FLOW EAST TO WEST
ON
SECTION EAST OF DRAIN
DRAINAGE CURRENT = 318 Amps.
DRAINAGE CURRENT = 531 Amps.
E = 1.04 e^-0.00736x
E = 5.8.4 e^-0.00736x
m = 0.00137
DISTANCE FROM DRAIN - FEET
0 96 192 288 384 480 576 672 768 864 960 1056 1152 1248 1344 1440 1536 1632 1728

this particular cause merely indicates the limit of effective current application.

From the relationship shown by the graphic analysis of these data, the following empirical relationship is indicated:

$$E = C\,e^{-mx} \qquad (1)$$

Where:

E = IR drop in millivolts

C = Constant, expressed in millivolts. This constant is a function of the unit resistance of the pipe line, the length of the contact interval and the magnitude of the current drained.

e = 2.718

X = Distance from the point of drainage to the midpoint of the contact interval.

m = Slope of the curve plotted to logarithmic coordinates. This factor is a function of the soil resistivity and the resistance of the anodic and cathodic surfaces.

From Ohm's Law the following relation exists:

$$1000\ IR = Ce^{-mx}$$

Transposing:

$$I = \frac{C\ e^{-mx}}{1000R} \qquad (2)$$

Where R is the resistance of the section of pipe between the points of contact. A further refinement of equation (2) is made by rationalizing the factor

$$\frac{C}{1000R}$$

If the distance from the drainage point to the mid-point of the contact interval is zero feet, then

$$I = \frac{C}{1000R} = I_d \qquad (3)$$

and $\frac{C}{1000R}$ can be replaced by the drainage current, I_d whence

$$I = I_d\, e^{-mx} \qquad (4)$$

The current collected by the line between the points x_1 and x_2 is expressed as follows:

$$\sum_{x_1}^{x_2} I = I_d\left(e^{-mx_1} - e^{-mx_2}\right) \qquad (5)$$

or

$$\int_{x_1}^{x_2} I = \int_{x_1}^{x_2} dI \qquad (6)$$

Differentiating equation (4)

$$dI = -\,mI_d\, e^{-mx}\, dx \qquad (7)$$

The current density is the current collected per unit area,

$$\oint = \frac{dI}{dA} = \frac{dI}{\pi D dx} \qquad (8)$$

where D is the diameter of the pipe in feet. Dividing equation (7) by dA we have

$$\oint = \frac{mId\, e^{-mx}}{\pi D} \qquad (9)$$

Where $\oint$ is the current density expressed in amperes per square foot caused by the drainage current I_d at any point x feet from the negative return. Since the current density considered necessary for protection is measured in milliamperes per square foot, equation (9) is converted to this basis and becomes:

$$\oint = \frac{1000mI_d\, e^{-mx}}{\pi D} \qquad (10)$$

Refering to equations (3) and (4) when the drainage current is to be determined in a single direction, the I*d* value for any one direction is determined by prorating the total output on the basis of the intercept values; or it may be calculated from a known or calibrated resistance value of the length of line in the contact interval direct from the IR drop measured on each section adjacent to the drain.

Sample Calculation

Fig. 4 illustrates the result of an exposure test on a 10,000-ft. section of bare welded steel pipe. The negative return was located at Station 62 plus 50 and the total current drained was 40 amperes.

Based upon intercept values, the pro rata portion of current flowing each side of the negative return are 20.2 amperes flowing from east to west and 19.8 amperes west to east.

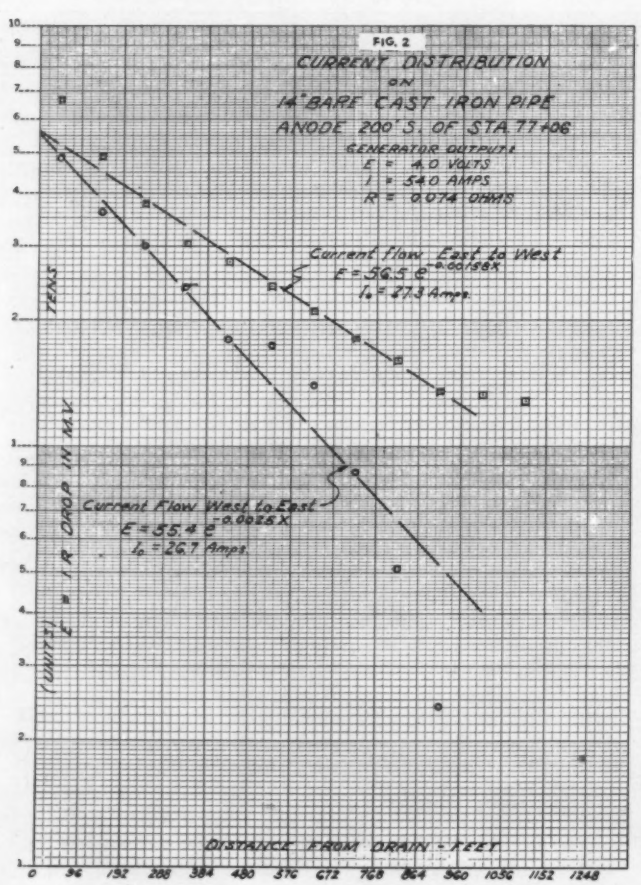


FIG. 2
CURRENT DISTRIBUTION
ON
14" BARE CAST IRON PIPE
ANODE 200' S. OF STA 77+06
GENERATOR OUTPUT:
E = 4.0 VOLTS
I = 54.0 AMPS
R = 0.074 OHMS
Current Flow East to West
E = 56.5 e^-0.00198X
Io = 27.3 Amps.
Current Flow West to East
E = 55.4 e^-0.0028X
Io = 26.7 Amps.
E = I R DROP IN MV.
(LOGARITHMIC)
DISTANCE FROM DRAIN - FEET
0 96 192 288 384 480 576 672 768 864 960 1056 1152 1248

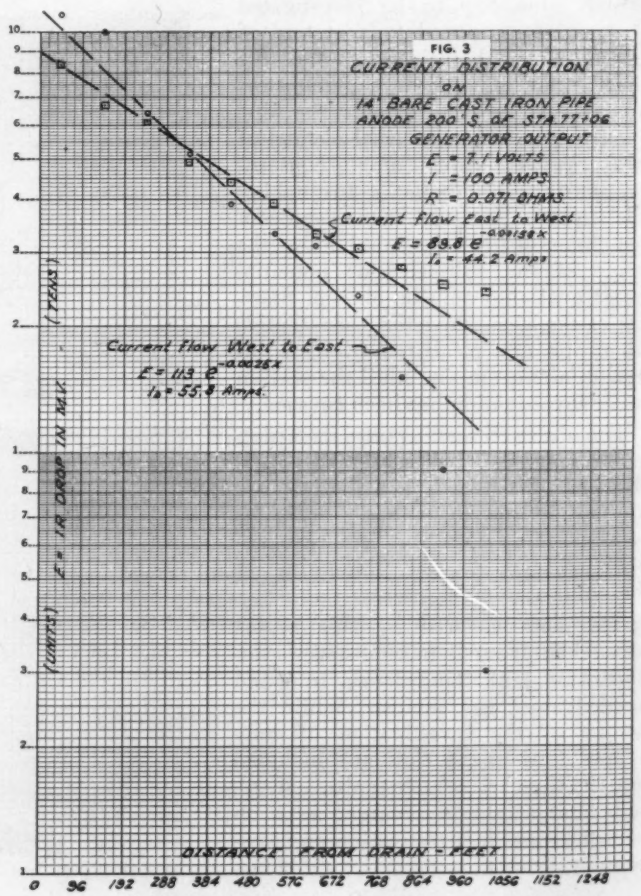
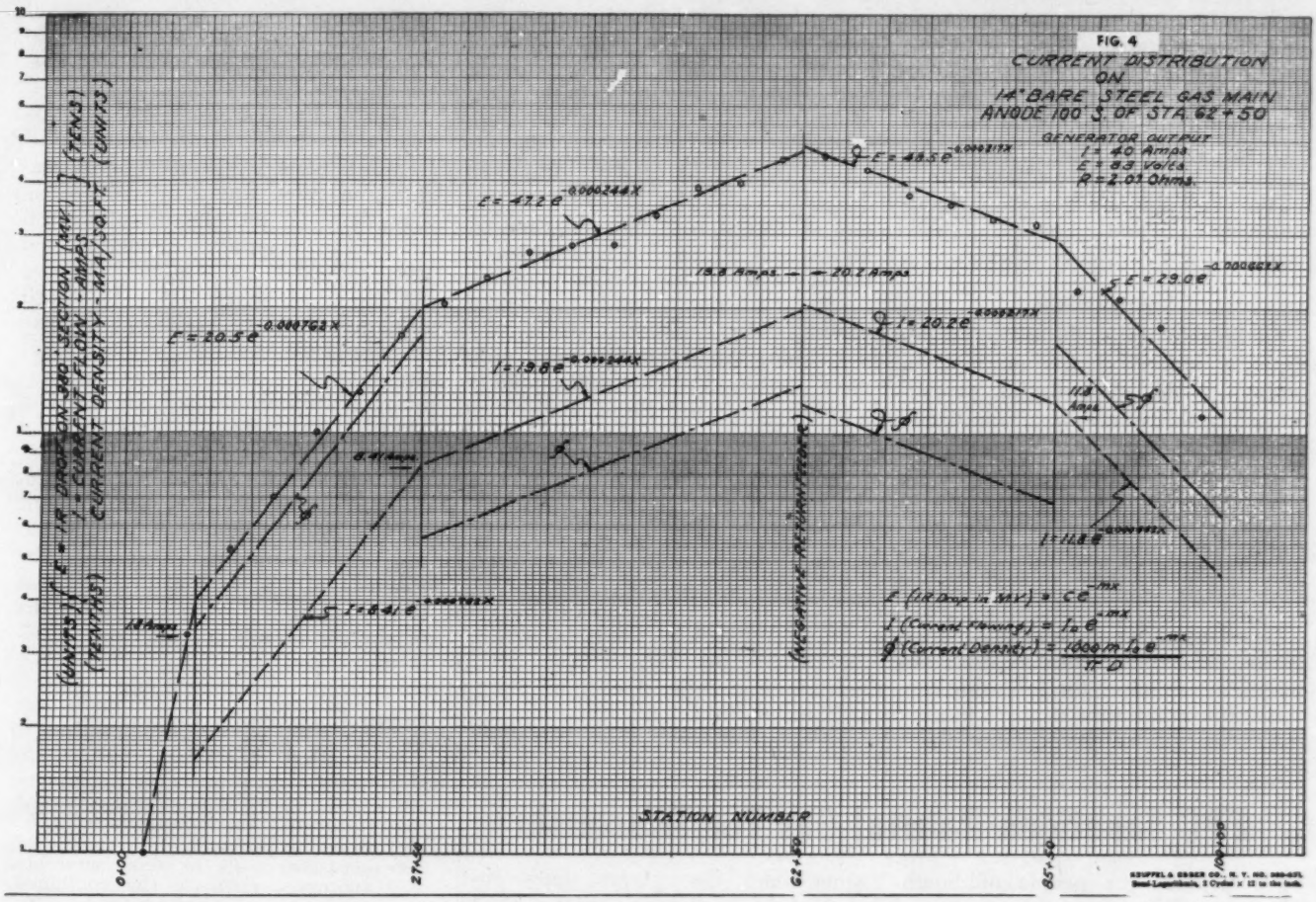


FIG. 3
CURRENT DISTRIBUTION
ON
14" BARE CAST IRON PIPE
ANODE 200' S. OF STA 77+06
GENERATOR OUTPUT
E = 7.1 VOLTS
I = 100 AMPS
R = 0.071 OHMS
Current Flow East to West
E = 89.8 e^-0.00138X
Io = 44.2 Amps
Current Flow West to East
E = 119 e^-0.0028X
Io = 55.8 Amps.
E = I R DROP IN MV.
(LOGARITHMIC)
DISTANCE FROM DRAIN - FEET
0 96 192 288 384 480 576 672 768 864 960 1056 1152 1248



Using the point slope method, the slope is calculated as follows:

$Y_1 = 47.0$ Log $Y_1 = 1.67210$ $X_1 = 0$
$Y_2 = 20.0$ Log $Y_2 = 1.30103$ X_2 3500

Log Y_1 − Log $Y_2 = 0.37107$, $X_1 - X_2 = -3500$

$$m = \frac{0.37107}{-3500} = -0.000106$$

Converting to Log_e, $m = -0.000244$

$$I_x = 19.8\, e^{-0.000244}$$

Calculating the current flowing past Station 27 plus 50.

$-mx = -0.855$

$e^{-mx} = 0.425$

$I_x = 19.8 \times 0.425 = 8.41$ amperes

The current density over the section of pipe between Station 27 plus 50 and 62 plus 50 is calculated by substituting the above values in Equation (10). The value of D, pipe diameter, is expressed in feet.

$$\oint = \frac{0.244 \times 19.8\, e^{-0.000244x}}{3.1416 \times 1.6}$$

The value of $\oint$ at Station 62 plus 50 where $X = 0$ is

$\oint = 1.32$ milliamperes per sq ft

The value of $\oint$ at Station 27 plus 50 where $X = 3500'$ is

$-mx = -0.855$

$e^{-mx} = 0.425$

$\oint = 1.32 \times 0.425 = 0.562$ milliamperes per sq ft.

Each successive series of observed IR drops measured along the line exhibiting different slope characteristics must be treated individually. The recommended procedure is to consider that the drainage point of each section of different slope occurs at the point of maximum current value.

Discussion of Results

Figs. 2 and 3 represent the graphic relation between IR drop and distance from the negative return. Fig. 2 shows the distribution of total drainage of 54 amperes and Fig. 3 shows the distribution over the same section of line with a total drainage of 100 amperes.

It is to be noted that the slope of the distribution curve remains unchanged regardless of current value. The value of the intercept changes in direct proportion to the amount of current drained.

When a pipe line is subjected to a system of forced drainage, the current collected along it's length and carried back to the negative return is a cumulative process. Therefore, once the current distribution relationship is established for a known current value the current values existing at any point on the line for any other drainage current can be determined from the functional relationship established.

It is to be noted that the magnitude of the current flow along the pipe decays exponentially as the distance from the point of drainage increases. From the relationship established by the data illustrated by Fig. 4 we have three separate curves all of the same general type. Each of the three curves for a particular section of line have the same slope differing only by the co-efficient applicable to the functional relationship indicated.

The curves showing the trend indicated by IR drop and current values are both cumulative and continuous whereas the current density curves are not continuous. A change of slope occurring in the current distribution curve causes an off-set in current density value at the point of intersection. At the boundary between two different current distribution curves, the curve having the steepest slope will have the greatest current density at the point of slope change. However,, it is believed by the writer that the transition from one current density to another at these critical points will be gradual and not as abrupt as the graphic illustration indicates.

From the trend indicated by the foregoing data the distribution of current in combination with a fixed anode can be predicted for any reason-

able drainage value. Hence, if two or more adjacent units are so located as to drain the same section of line if operating successively, it is assumed that the laws of superposition will apply when two or more adjacent units on the same line are operating simultaneously.

Conclusions

Farraday's Law of Electrolysis states that the amount of any element deposited at the electrodes is proportional to the quantity of electricity passed through the electrolyte. Therefore, some measurement of the quantity of electricity flowing per unit of surface area in contact with the electrolyte will reflect the electrical position of the structure relative to the magnitude of corrosion.

Based upon an analysis of the experimental data presented and discussed in this paper the following conclusions were drawn:

1. The current distribution on a pipe line exposed to a system of forced electrical drainage decays exponentially with the distance from the point of drainage.

2. A graphic solution of the observed data gathered by reading IR drops on a pipe line exposed to a system of forced electrical drainage indicates soil boundaries or changes in the character of the soil by a change in slope of the current distribution curve.

3. The current density at any point on a section of pipe line exposed to a system of forced electrical drainage is directly proportional to the current drained, the slope of the current distribution curve and the distance from the point of drainage.

4. The currents approaching and leaving a cardinal point on a pipe line exposed to a system of forced electrical drainage are equal.

REFERENCES CITED

a. J. M. Pearson, Electrical Instruments and Measurements in Solution of Electrolysis Problems, Prepared for Bureau of Standards Corrosion Conference, 1937.

b. O. W. Eshback, Handbook of Engineering Fundamentals, John Wiley & Sons, Inc.

FPC Sanctions Natural Gas For Wisconsin

TO provide the people of Southeastern Wisconsin with an assured source of supply of natural gas the Federal Power Commission on Sept. 18 (1) directed Natural Gas Pipeline Company of America to extend its transportation facilities to connect with those of Wisconsin Southern Gas Co. at the Illinois-Wisconsin state line near Genoa City, Wis., and to sell natural gas to the latter company for distribution to its customers in southeastern Wisconsin; and (2) authorized Wisconsin Southern to construct and operate a 4½-in. transmission main extending northward from this connection for 50,000 ft. to the company's existing facilities at Lake Geneva, Wis.

In conformance with the Wisconsin Public Utilities Act, Wisconsin Southern has both local and state authorization to substitute natural gas in lieu of the manufactured gas, it now serves about 4000 customers in an essential agricultural and resort area in Walworth and Racine counties.

According to the FPC's opinion, Wisconsin Southern's manufactured-gas plant is inadequate and undependable to meet present and future requirements. Its existing plant could be put into satisfactory operating condition at a cost of $48,000, and additional gas manufacturing facilities of adequate capacity could be installed for about $142,600. On the other hand, the opinion states, such expenditures do not appear to be economically feasible due to the fact that the company's average annual return on a claimed rate base in recent years has approximated only 2%.

Wisconsin Southern proposes to discontinue the manufacture of water gas and convert its system to use straight natural gas after completion of the connection with the Pipeline Company's facilities, and the applicant's 4½-in. line. The estimated cost of the pipeline and appurtenances to be constructed by Wisconsin Southern is $55,000 and the construction to be undertaken by the Pipeline Company will cost an estimated $20,622.

The Pipeline Company has expressed its willingness to make the proposed interconnection if directed to do so by the Commission, and to sell Wisconsin Southern its entire natural gas requirements at rates currently on file with the Commission. The Pipeline Company will complete construction of its 20-in. pipeline, extending from its Geneseo, Ill., compressor station, about 29 miles north to a point southwest of the Illinois-Wisconsin line near Richmond, Ill., by installing the necessary crossings under two railroads in McHenry county, Ill., and will construct about 6000 ft. of 3½-in. and 4½-in. pipeline and appurtenant facilities to extend from its 20-in. line near Richmond, Ill., north to the Illinois-Wisconsin state line.

One of the reasons urged by Wisconsin Southern for the granting of its application is that cost of operation and rates would be reduced as a result of the introduction of natural gas. The company's manufactured gas production expense in 1943 was $85,265 or 51½c per Mcf. The record discloses that an equivalent volume of natural gas could be obtained from the Pipeline Company under its existing wholesale rate schedule for firm gas for $12,170 (14c per Mcf), a saving of about $73,000.

The reduced rates which the company proposes to charge would result in a saving to customers of $38,438 per year based on 1943 sales, after payment of the state natural gas use tax of 7c per Mcf. About three-fourths of the company's customers are residential users.

New Canadian Gas Field in Making

A major natural gas field appears in the making in the Canadian province of Saskatchewan. Bata Petroleums Ltd., an independent company, has completed six successful wells in eight attempts and engineers estimate the combined open flow in excess of 30,000,000 cu. ft. daily.

The company started its work in May, 1944, at a location about four miles south of the town of Unity, from which the field has taken its name, and about 33 miles inside the border from Alberta. This is the first major discovery made in Saskatchewan and plans already are well underway to market the gas.

Unity Gas Supply Co. holds a franchise to supply Unity from the newly-discovered wells, with the franchise extending for 20 years from March, 1945. All materials have been ordered for the pipeline, and all necessary government permits have been ratified.

The field's gas reserves are measured by the Core Laboratories of Dallas, Texas. The last Bata well, No. 8, which had an open flow of around 10,000,000 cu. ft. a day, enlarged the proven field from 900 to 1800 acres. The company holds 580,000 acres of reservations.

Gen. Arnold Commends A.G.A. Testing Laboratories

Official recognition of the importance of A.G.A. Testing Laboratories war services toward final victory was contained in a communication received by the Laboratories from Commanding Gen. H. H. Arnold of the Army Air Forces. Gen. Arnold saluted the employees of the Laboratories primarily for their development of the A-11 automatic oxygen regulator, a new and original design for supplying passengers in transports and troop ships with correct amounts of oxygen at various altitudes. Prior to its development devices for this particular purpose were not available.

Pacific Coast Gas Association

CONVENTION In Print

52nd Annual Meeting — October 3-4, 1945

Del Monte Lodge — California

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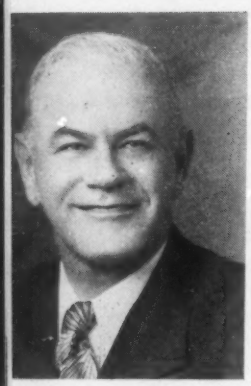
E. T. HOWARD
General Chairman
Manufacturers Section

C. E. PEARMAN
General Chairman
Accounting Section

W. M. JACOBS
General Chairman
Sales and Advertising
Section



W. F. PAPE
General Chairman
Technical Section

O. R. DOERR
President

PCGA
OFFICERS
AND COMMITTEEMEN
FISCAL YEAR
1945

H. W. EDMUND
Vice President
(President Elect)

IDLOW SHONNARD, JR.
hairman Personnel Committee

RUTHELLEN BEACH
Chairman
Women's Committee

LEROY M. EDWARDS
Vice President Elect

R. R. GROS
Chairman
Cooperative Advertising
Committee

General Sessions

President's Address

By O. R. DOERR, *President*

Pacific Coast Gas Association

MY PLEASURE in opening this Convention in print, a meeting which can be attended by all of our members no matter how distant, is tempered by regret that it cannot be one of the great conventions of our Association. We have begun the period of transition from war to peace and many problems lie unsolved before us. All of us need the contacts, the information, and the inspiration which only an industry gathering can provide. It would have been helpful had we been able to have had such a general meeting now when we are preparing our production schedules and our sales tactics, for now is the time when business men must plan wisely, act boldly, and work together if free enterprise is to prevail in our country.

A year ago when I was honored with the presidency of the Pacific Coast Gas Association, I dedicated my year in office to preparation for return to a full peacetime operation. Previous administrations had planned wisely and well for the great part the gas industry has played on the home front in our war effort, and it was our job to follow through into reconversion to peace.

As it has turned out, the war's ending is behind the schedule I had in mind a year ago and we are just preparing to resume our peace-time operations. But nevertheless, while it is always true that one's actual accomplishments never live up to one's hope of accomplishment, I take a great deal of pride in the progress made by the industry in the past year and the part the Association has taken in it. The reports of our section and committee chairmen record the Association's program in some detail so I need only comment on some of its broader aspects here. In doing so I must express my deepest admiration for those who have done the work. I can only mention the leaders here, but to C. E. Pearman, chairman of the Accounting Section; M. W. Jacobs, chairman of the Sales Section; W. F. Pape, chairman of the Technical Section; E. T. Howard, chairman of the Manufacturers Section; Ludlow Shonnard, Jr., chairman of the Personnel Committee; R. R. Gros, chairman of the Cooperative Advertising Committee; and Ruthellen Beach, chairman of the Women's Committee, we all owe a great deal. They have been real leaders.

The spade work of the Pacific Coast Gas Association's postwar planning program was done by the Committee for Gas Industry Development, headed by H. L. Masser, during 1943 and 1944, and reported at our last two annual meetings. It has fallen to us to make these reports effective by "selling" their recommendations to the industry. This we have done by printing excerpts of these reports and distributing them throughout the nation. The fact that they have been widely reprinted in the trade press and the many comments and calls for extra copies is evidence that our message sank home.

Our cooperative advertising to consumers and appliance dealers has been continued through its 17th year. Our copy theme has apparently been particularly attractive this year if we may judge from comment on it in the trade press, both our own and that of the advertising profession.

In lieu of the impossible convention, midyear conclaves and other types of general meetings, the Association sections have sponsored upward of 40 subject conferences during the year attended altogether by about 1500 people. The success and value of this type of meeting has been so striking that I urge a continuance of the policy. Some of the subjects have been of interest to utilities alone, some to manufacturers alone, but particularly productive have been the meetings of the several appliance councils organized by the Sales Section and attended by representatives of both utilities and manufacturers. The accomplishments of these councils have already proved the soundness of their organization and the great possibilities they have for constructive sales planning.

The gross business of the industry has continued to grow—customers at the rate of about 3% a year, cubic foot sales and gross revenues at about 10%. While these rates of growth cannot be maintained into peace time, and indeed some recession can be expected, they are evidence of the vitality and usefulness of our business. Perhaps with the pressure off and adequate materials and personnel available to us, we can bring our net revenues back in line with our needs for the continued expansion which I am confident will be necessitated by the solid progress of this West Coast Empire. The future is a tremendous challenge to our sales people. There are many estimates of the backlog of business which the war scarcities have created, but beyond this there still remains a great and growing market for modern appliances and the gas which makes them tick. It will be a highly competitive market. Our success in getting our share will depend on the way we use the research, the sales training and the promotional tools developed cooperatively by this and the American Gas Association.

The Association is growing with the industry. During the year we have added more than 100 members to our roster, two of these being gas companies, six manufacturing companies, and the balance individuals. I am pleased to report that out of 83 members in the armed services, 17 have already been reinstated to active membership. I might observe that the Pacific Coast Gas Association has not had a membership committee for over 15 years.

The Association's finances are in excellent condition. Some of our normal expenses have been lessened for the past two years and the savings have been carefully husbanded so that the Association may be in a position to finance such postwar promotional and research activities as may be approved by the Board. One such activity is already under way. It is a motion picture with color and sound depicting the fundamental background of the manufactured and natural gas industry. It attempts to tell what gas is, where it comes from, and how it is used. This picture will be ready this Fall and the entire cost of its production is being borne by the Association. Prints will be offered to gas companies at the cost of the print alone. It will be useful in employee education programs and can be shown profitably to schools, service clubs and similar groups.

It is probably unnecessary to "sell" the Association to its membership. More than most associations it has an enthusiastic and working membership. However, it is easy to forget the tremendous influence this Association has exerted in the industry and the prestige it has attained. There are still specifications being written for P.C.G.A. standard pipe flanges promulgated by the Association in 1896. Orders are still being received for our Gas Appliance Installation and Service Manual out of print since 1928, and the first book of its kind in the industry. Our Gas Engineer's Handbook, published in 1932, is still the standard engineering reference work of the industry. The Association has received $3,000 in royalties from its publisher. The Association has published three editions of an Architects and Builders Manual, a field in which it again pioneered. Our domestic salesmen's training course, published unfortunately just at the outbreak of war, probably will be superseded by the course now being made ready by the American Gas Association, but it is pleasing to us to note that several hundred copies of our course have been sold in this country, Canada and Australia since the beginning of 1945. Our Annual Proceedings are in demand all over the world and are particularly valued by engineering libraries. The volume and variety of written and verbal inquiries received and ably answered by the Association's office would amaze you. They come from everywhere on every conceivable subject.

I highlight some of the accomplishments of the Association only to remind you that it is a going and useful institution, and

to preface a recommendation that the incoming administration appoint a committee of executives to study the relation of the Association to the industry to the end that perhaps it be better financed and given even more work to do. I believe our regional association can work more closely with the American Gas Association to the advantage of both groups, and that a definite policy should be laid down in this regard. The Pacific Coast Gas Association has only three employees and the time of one of these is almost wholly occupied with the affairs of our growing and active Manufacturers Section. We get by as well as we do because of the generosity of the Southern California Gas Company, which supplies office space and stenographic service in Los Angeles. I think more field work should be done in the future by our paid staff, but this will be impossible in any great measure without adding to the staff. The desirability of this increased activity will become apparent during the coming year as the industry enters the competitive race which we all know is before us. The budget which will be presented to the Board of Directors at its annual meeting does not provide for these things because of our feeling that careful executive study should precede any general increase in budgets. Hence this recommendation.

In passing to the next item on our program let me again thank all committee workers for their efforts during the year. The fundamental reason for the success of the Pacific Coast Gas Association lies in its interested and hard working membership. My experience has been that no call upon our members has remained unanswered and no request refused.

I close this introduction to our "Convention in Print" by expressing my grateful appreciation to the publishers of *GAS* for making it possible. One of the most productive accomplishments of our Association resulted from enlisting the interest of Jay Jenkins in the gas industry and helping him in the initial establishment of this publication.

Report of Cooperative Advertising Committee*

By R. R. Gros, *Chairman*

Pacific Gas and Electric Company

FOLLOWING severe curtailment of the Pacific Coast Gas Association cooperative advertising appropriation after Pearl Harbor, it was gradually increased again by contributing companies during the war years. And for the current 1945 calendar year the budget has approached prewar normalcy. Copy was largely devoted to support of war projects until early this year when, in anticipation of postwar reconversion, your Committee began paving the way for resumption of appliance selling in line with the advertising policy of member gas companies.

Probably the most significant fact about this cooperative regional advertising of ours is its duration and consistency—a record of which the gas industry of the West may well be proud. It has had its ups and downs—according to whether the financial fountain from which all advertising blessings flow has gushed or slowed down to a trickle—but the campaign has never missed a single month out of the 204 months since its inception in 1929. In short, 1945 comprises the 17th consecutive year of continuous P.C.G.A. regional cooperative load-building. Few, if any, other industries can cite such a record, nor has any other regional group in our own industry approached it.

It has always been the policy of your Cooperative Advertising Committee to obtain the greatest possible value for whatever funds were allocated, and the present year is no exception. We hope you recognize that a budget of less than $50,000 a year for state-wide coverage is small, considering California's present population, industrial growth, and total income. Frankly I am very proud to be associated with a Committee that has done such a commendable job in carrying on the Association's advertising tradition of 17 years standing.

With our 1945 regional budget of approximately $46,500 we are producing more than 60 separate advertisements—mostly full pages or half pages—and publishing them in 20 domestic magazines and trade journals having a combined circulation of over 400,000, or a probable readership of at least 1,000,000. Most of these magazines are carrying a full schedule of 12 insertions; a few 6 insertions.

The schedule includes 12 full-page advertisements, with color, in three domestic magazines: Sunset, California Parent-Teacher and California Federation News—and black-and-white adaptations of these in two other magazines influencing housewives and teachers: Parent-Teacher Journal and Parent-Teacher Courier. In addition, a special full-page color ad was prepared this year for California Plan Book covering 10,000 prospective home builders.

The trade journal schedule is divided into nine divisions serving the following fields: Commercial cooking, commercial baking, appliance dealers, plumber-dealers, architects and builders, metals and machinery, general manufacturing, building inspectors, and (for the information of our own people, a monthly column in *GAS* Magazine.) A special series of trade journal ads is prepared for each of the classifications.

Besides these advertising activities, we have maintained a continuous publicity service, supplying news items, pictures and feature articles to trade journal editors for which work the Committee appropriated $250 a month this year, plus necessary art-mechanical costs and traveling expenses, or about $4,000 out of the total budget of $46,500. Thus articles on gas utilization are constantly being published, most of which would never have gotten into print except for the contacts we have built up with appreciative editors and the helpful service we give them in obtaining technical information and pictures. Over the years we have averaged at least 100 published articles annually.

We consider this publicity work a very important part of our activities on behalf of the entire western gas industry, and recognize, of course, that it is facilitated through the paid advertising in media which are of too general coverage for individual gas companies to employ soundly and economically.

In fact, it is the existence of such general media that inspired the original plan of P.C.G.A. cooperative advertising and publicity. Throughout the entire 17 years your committees-in-charge have hewed to the line of confining their effortts and expenditures to media which are not available to individual companies or which can be used more economically on a cooperative basis.

I should like to emphasize the industry-wide importance of another policy which has never varied. Although the cooperative advertising benefits utilities, appliance manufacturers and dealers alike, it has always been paid for in full by the gas companies—at first, including those of Oregon and Washington but during recent years supported by California companies alone.

You may be interested in a word concerning our domestic advertising theme for 1945 which is unique and has attracted national attention. The entire domestic series is built around what we have termed, "The Flame Family"—or the "Gas Flame Quints"—pictured as little elves or "good gremlins" in the form of animated flames, suggested by some of the popular Walt Disney characters. They portray the five major sales points of gas fuel and are named accordingly: SPEEDY, for the fast action of gas; CLEANY, for its cleanliness; STEADY, representing the dependability of gas fuel; FLEXY, to dramatize flexibility of heat control; and THRIFTY, who of course is the Scotch member of the clan, representing economy of operation and upkeep. We have received much evidence to show that they have a very strong appeal to *women,* and home-makers, of course, are the primary group to be influenced.

These Gas Flame Quints have been written up in the national gas and advertising trade journals, publicized by the A.G.A. in its bulletins, pictured and described by appliance manufacturers in their house-organs, and used, with our permission, by at least one eastern gas company in local advertising. Our agency has suggested that this idea be continued, with variations, throughout our 1946 campaign.

*Cooperative Advertising Committee: R. R. Gros, Pacific Gas and Electric Company, Chairman; R. L. Hayden, Coast Counties Gas and Electric Company; Hamilton Knott, Southern California Gas Company; C. H. Potter, Southern Counties Gas Company; F. M. Raymond, San Diego Gas and Electric Co.

Which brings up an important reason for my being here; namely, to urge your continued support next year of this important phase of our industry's public relation and sales activities—including domestic, commercial and industrial advertising and publicity. A little later the Committee will submit, through Clifford Johnstone, its recommended plan and budget for 1946. At our next meeting suggestions from industrial and commercial sales departments will be reviewed, and we know in advance that some of these representatives, at least, want *more* support from our committee's program in the form of larger space, more frequent insertions and use of color in certain important trade journals. The question of cooperative use of radio is also up for consideration and we hope soon to have some recommendations to make to the Association on this important medium. Early in the history of the campaign our program included for three years the use of NBC's Pacific Coast Network, participating in the Woman's Magazine of the Air to reach housewives. Thereafter individual companies launched their own radio programs and for some time the Mystery Chef was sponsored by various members. Now our Committee, representing gas company advertising or sales departments, is considering a recommendation to use regional radio facilities again on a cooperative basis.

A cooperative program sponsored by the participating utility companies, might be particularly timely now. My own company, Pacific Gas and Electric Company, for example, is at present off the air; the southern companies have indicated that they are at least willing to consider the advisability of supplementing their Evening Concert with a program of wider appeal, and certainly the smaller member companies cannot afford a purely local program of the qualtiy desired.

As all of you recognize, we are entering a period of highly competitive sales activity and of opportunity such as perhaps the West has never known. We can be sure that the electrical industry will be in there slugging, and if gas fuel and gas appliances are to hold their own, now, if ever, is the time to put on advertising pressure.

Report of Personnel Committee

By LUDLOW SHONNARD, JR.

Chairman, Southern Counties Gas Company

THE Pacific Coast Gas Association sponsored two Personnel Conferences during the year which were held on December 6 and 7, 1944, and July 11 and 12, 1945. The first conference was held in San Francisco and the second in Los Angeles. At the San Francisco conference in December it was possible to include representatives from the operating divisions of the various companies. This was particularly helpful since personnel people and operating people were given an opportunity to view personnel problems from the other's viewpoint.

SAN FRANCISCO MEETING

The companies represented at the December Conference were: Central Arizona Light and Power Company, Coast Counties Gas and Electric Company, Mountain Fuel Supply Company, Pacific Gas and Electric Company, San Diego Gas and Electric Co., Southern California Edison Company, Southern California Gas Company and Southern Counties Gas Company. A comprehensive analysis was given all phases of the multiple personnel problems which have arisen as a result of our wartime economy. Two major problems were afforded particular emphasis due to their steadily increasing importance in the personnel field. These were the reemployment of returning military service personnel and collective bargaining problems. In addition War Manpower problems were discussed. This discussion included such topics as ceiling controls, Selective Service problems, and general employee-management relations. Several of the representatives in attendance presented an informative discussion of their past experiences in the field of employee training.

Reemployment of Veterans

The various phases of the veteran reemployment program were particularly accented. The discussion ranged from the various methods of keeping in touch with the employee while he is on military leave to a consideration of special job training programs and refresher training procedures for the returned serviceman. It was mutually agreed that the program for orienting the returnee back into his job should be handled with as much normality as the circumstances would permit.

In addition, there was an open discussion of other phases of the veteran reemployment program. It was agreed that full advantage should be taken of new and specialized training received while the employee was in military service. An informal questionnaire was suggested as one method of obtaining a record of a veteran's experience and interest while on military leave. The need for careful job analysis in placing physically handicapped veterans and in training them in their old or new work was recognized by all of the companies. A number of periodicals, books and pamphlets were cited as constructive aids in placing the physically handicapped veterans.

Collective Bargaining

The conference devoted a major portion of its time to a detailed consideration of collective bargaining problems. The resulting discussions proved very constructive due to the varied experiences in the field of collective bargaining of the companies represented.

General

During the course of the conference, information was presented on war manpower problems and employee training. The discussion of employment stabilization indicated that no serious difficulties were being encountered in connection with ceiling and referral controls. The exit interview required in connection with the granting or denying of Statements of Avaliability to terminating employees, furnished an interesting cross-section of the reasons for terminations. General information was exchanged regarding the various companies' experiences in employee morale work. Most of the companies represented used employee publications as a stimulus. One of the companies used a special introductory series of informative letters which are given to all new regular employees following employment. Another company utilized employee counselors who contacted employees on the job to informally discuss the status of their work. Consideration of employee training revealed that several companies represented have been using the War Manpower Commission's "Training Within Industry" program. It was emphasized that the full value of these programs could be obtained, only if they were periodically followed up.

LOS ANGELES MEETING

The companies represented at the July conference were: Coast Counties Gas and Electric Company, Mountain Fuel Supply Company, Pacific Coast Gas Association, Pacific Gas and Electric Company, Pacific Lighting Corporation, San Diego Gas and Electric Company, Seattle Gas Company, Southern California Edison Company, Southern California Gas Company, Southern Counties Gas Company, and the Tucson Gas Company. The conference was originally planned to center around job analysis and evaluation. However, due to the uncertainty regarding governmental policy and trends in respect to labor relations and stabilization and since a number of companies were actively engaged in contract negotiations, the conference was organized on an informal basis with a general agenda of suggested discussion subjects which permitted an interchange of experiences and ideas on current personnel problems. The informal discussion motif of this conference was further accented by seating the participants around a large conference table in a private council chamber. Three major groups of current problems were covered—collective bargaining, labor laws, and general personnel matters.

Collective Bargaining

The discussion of current labor contracts particularly emphasized provisions negotiated since the last conference. Proposed new provisions of contracts currently being negotiated by several of the companies represented were discussed and general collective bargaining trends were analyzed in regard to industry practice and experience.

One of the collective bargaining problems discussed at some length was the value of shop committees as an aid in handling minor problems not normally handled through grievance machinery. The shop committee plan in use in one of the member companies was described. The committees, composed of two local management representatives and two local union representatives, are scheduled to meet once each month to discuss an agenda of topics which is submitted in advance. The operation of the Shop Committee Plan has served a twofold purpose, i. e., focused attention on minor "irritants" which might have developed into grievances, and promoted supervisor-employee relations by handling the problem locally.

The national trend toward foremen unionization was discussed, with particular emphasis upon the underlying factors responsible for the movement. It was generally agreed that two of the most important considerations of the foremen union trend were the level of supervision to be represented by the union and whether or not rank and file employees would also be represented by the same union.

Laws and Regulations

Certain pertinent portions of the Fair Labor Standards Act were reviewed with special emphasis on exempt and non-exempt employees, record-keeping, definitions of working time, etc. Various provisions of state labor laws were reviewed. Particular consideration was given to working hours and conditions of employment of women and minors.

Wage and Salary practices under existing stabilization policies were reviewed. All companies represented reported essentially similar experiences in dealing with the War Labor Board or the Treasury Department's Salary Stabilization Unit. All conferees recognized the importance of keeping adequate records to support wage or salary changes.

General

Additional personnel problems discussed included current employee selection techniques and job analysis and evaluation. The discussion indicated that the majority of the companies represented were continuing some form of employee selection in spite of the labor shortage. A number of current developments in employee selection were reviewed and found to contain merit. Some of the developments discussed were the "Weighted Application Form," the "Planned Interview," and the selection and placement tests and techniques which have been developed by the Army and Navy. It was agreed that these developments should be given detailed consideration as soon as objective data is generally available.

Several of the participating companies had accentuated their job analysis and evaluation programs. Two approaches to this problem were outlined in some detail and benefits obtained by the companies having the most extensive experience in this work were discussed. Point evaluation systems in use or in process of formulation were discussed. It was generally agreed that job analysis and evaluation merited more attention than it had received to date.

Conclusion

The personnel conferences of the past year were designed to serve a twofold purpose, i. e., to acquaint the representatives of the participating companies with pertinent industry trends in the personnel field and to provide a "clearing house" for the exchange of views and future plans with respect to personnel matters.

Each discussion session of the two conferences held during the year were premised upon a free exchange of ideas and a sharing of experiences on the part of the participants for the mutual benefit of all. If the success of these conferences may be expressed in terms of active participation on the part of the representatives present it is felt that these conferences were eminently successful.

Report of Women's Committee

By RUTHELLEN BEACH, *Chairman*

Southern Counties Gas Company

REPORTS from the various Women's Committees of the Pacific Coast Gas Association indicate that our women devoted their main efforts during the year to a variety of war aid activities. The educational and promotional program which engages the Committee's attention in normal times went by the board, and all of our people threw themselves unstintingly into tasks designed to bring comfort and relief to our men and women in service.

In San Francisco, the Pacific Gas and Electric Company's Women's Committee, under the able chairmanship of Esther Young, sponsored the canteen at the Palace Hotel, and manned it on a regular schedule throughout the year. They took their turn operating a mobile coffee and doughnut unit which served hot refreshments to guards and members in the service along the water front of the San Francisco Bay area. They were right on the job at the canteen during the history making Peace Conference and were delighted to have the privilege of serving. A group of P. G. & E. women are also active as Gray Ladies at the De Witt Hospital and regularly sponsor entertainment in one of the ward rooms.

Coast Counties Gas and Electric Company women shone brilliantly in their Civilian Defense Work, doing such a competent job at the control center posts that it was well known that the police department was tempted to take them away from their gas company duties. These women made certain that a large number of packages were sent to the men overseas who had no family of their own. Assistance was given financially to the local "Teen Age Canteen." The committee under the guidance of Constance Mattei also sponsored dances for the service men and filled a regular scheduled evening at the Santa Cruz United Service Organization.

The already famous "Toastmistress Club" of the San Diego Gas and Electric Company's Women's Committee won more acclaim for itself during the past year. These women carried on a well rounded program with attention focused on Nutrition, Red Cross Services and the GASCO Girls' Service Organization for the U. S. O. Their chairman, Virginia Fitzgerald, reports the year, in that busy center of war activity, a full and profitable one.

The San Joaquin Power Division of the Pacific Gas and Electric Company, under the chairmanship of Kathryn Yoksh reports an outstanding contribution. They had under their sponsorship, Ward A-6 of the Hammer Field Regional Hospital. The day room of the orthopedic ward was decorated by the Women's Committee members and their assistants. Thought then turned to the entertainment of the men there. New books and magazines were contributed to the Red Cross Library. A writing board, complete with clips to hold the paper, was presented to the boys who had the use of only one hand. Card and game parties were held, and at all the get-togethers, homemade cakes, candy, ice cream, coffee or chocolate was served by the women and thoroughly enjoyed by the fellows in the ward.

Edna Martin, chairman of the Southern Counties Gas Company of California, lists a variety of activities which were carried on by the women in the Southern Counties system.

The Ventura County Women's Committee furnished a day room at the Hoff Veterans Hospital near Santa Barbara.

In Santa Monica the local Women's Committee found a need for their spare hours at the Redistribution Center. Many of the women worked as Nurses Aides and filled volunteer positions with the Red Cross and the United Service Organization.

The women of the Santa Barbara District found a special interest in their local U. S. O. and all the women were active in some field of volunteer work for the Red Cross.

The Eastern District's main project is the Casa Colima Home. This orphanage has for some time been the focal point for the Women's Committee. They have provided parties and picnics for the children, remembered birthdays and all the special holidays with cards and presents, along with many necessities not furnished by the Home.

Harbor District women worked as Junior and Senior hostesses since the inception of the United Service Organization. Many of these girls proudly wear their "Thousand Hour" pin. They contributed much to the enjoyment of the service man away from home, in the way of food, fun and entertainment. Most of all, they were unselfish with their hours of service.

The San Gabriel Valley Women's Committee took on a project sponsored by the United States Coast Guard, to fill service kits for the returning veteran, who sometimes came aboard ship with all his personal belongings lost. These kits contained soap, towel, face cloth, a comb, shaving cream, razor blades, a chap stick, tooth brush and tooth powder, and were neatly packed into a zippered bag. About 30 service kits per month have been turned into the Coast Guard Station at Long Beach.

Mrs. Martin is proud to announce that the largest district in the company, the Orange County District, has a newly organized Women's Committee under the direction of Miss Katherine Wallace.

Lois Smelser, of the Seattle Gas Company, says their women have been very busy with the war-time activities but has signified that they will again join forces with us this coming year.

It is to be noted that our women have participated without stint of time, effort or in more material ways, in the War Bond Drives, Red Cross Drives, Blood Bank, the clothing drives for the relief of War Victims, and so on until you have named every War Aid Activity. We have members in all branches of the military service, the WAC, WAVES, SPARS and MARINES! We can be very proud of our gas company women. Many a community will testify to their invaluable help.

The war is over! The process of reconversion is an actuality. This "brave new world" we have been hearing so much about is in the making, now! With Victory in our hands, it is time to consider the latent possibilities of our committee in the year to come. We are ready to get our teeth into a well outlined program—we've greatly missed our contacts with our manufacturer friends, and we are eager to go forward to our true objective, GAS and GAS APPLIANCES.

Election of Officers*

THE NAMES of the following members were placed in nomination by the Nominating Committee:

For President: H. W. Edmund, Santa Cruz.

For Vice President: LeRoy M. Edwards, Los Angeles.

For Treasurer: D. G. Martin, San Francisco.

For Directors (2 year term):

H. W. Geyer, Los Angeles.
M. A. Pooler, Tucson.
E. D. Sherwin, San Diego.
E. H. Sutton, Los Angeles.

By mail vote of the entire membership, counted and verified at the Annual Meeting of the Board of Directors, the candidates named by the Nominating Committe were declared elected.

*Nominating Committee: F. W. Lawson, Chairman, R. V. Davis, F. E. Arden, L. M. Klauber, Paul B. McKee.

WHO'S WHO IN THE PACIFIC COAST GAS ASSOCIATION

President: O. R. Doerr, Pacific Gas and Electric Co.

Vice President: H. W. Edmund, Coast Counties Gas & Electric Co.

Treasurer: D. G. Martin, Pacific Gas and Electric Co.

Directors: F. M. Banks, Southern California Gas Co.; R. G. Barnett, Portland Gas and Coke Co.; F. F. Doyle, Pacific Gas and Electric Co.; H. Henry Gellert, Seattle Gas Co.; E. T. Howard, General Controls Co., W. J. McCoy, Southern Counties Gas Co.; E. L. Payne, Payne Furnace and Supply Co.; A. H. Sutton, Mission Water Heater Co.

Manufacturers Section

General Chairman—E. T. Howard, General Controls Co.

General Vice Chairman—Henry Honer, Western Stove Co.

Accessories Division: Chairman—Tom T. Arden, Grayson Heat Control, Ltd.; Vice Chairman—M. M. Kennedy, Domestic Thermostat Co.

Heating Division: Chairman—C. A. Gabriel, Monarch Heating Co.; Vice Chairman—Eric Slater, Ideal Heating Co.

Range Division: Chairman—H. W. Jackson, Jas. Graham Manufacturing Co.; Vice Chairman—H. F. Larkin, O'Keefe & Merritt Co.

Water Heater Division: Chairman—R. W. Tarleton, Southern Heater Co.; Vice Chairman—Claude Ballinger, Rheem Mfg. Co.

A. G. A. E. M. Directors: E. T. Howard and Henry Honer. Alternates: F. C. Packer and E. S. Hoyt, Jr.

Accounting Section

General Chairman—C. E. Pearman, Pacific Lighting Corp.

Subject Sponsors: Purchases, Stores and Payables—H. G. Lawrence, Southern Counties Gas Co.; Commercial Problems—J. W. Vanier, Southern Counties Gas Co.; Payrolls—A. T. Kelly, Pacific Gas and Electric Co.

Sales and Advertising Section

General Chairman—W. M. Jacobs, Southern California Gas Co.

Subject Sponsors: Domestic Sales—R. L. Hayden, Coast Counties Gas & Electric Co.; Commercial and Industrial Sales—A. O. Leech, Portland Gas & Coke Co.; Home Service—Mercedes Bates, Southern California Gas Co.

Technical Section

General Chairman—W. F. Pape, Pacific Gas and Electric Co.

Subject Sponsors: Distribution—F. A. Hough, Southern Counties Gas Co.; Transmission—R. W. Todd, Pacific Lighting Corp.; Utilization—D. E. Farmer, Portland Gas & Coke Co.; Accident Prevention—E. C. Hunt, Pacific Gas and Electric Co.; Automotive Transportation—Sponsor not yet appointed.

Personnel Committee

Chairman — Ludlow Shonnard, Jr., Southern Counties Gas Co.

Women's Committee

Chairman—Ruthellen Beach, Southern Counties Gas Co.

Cooperative Advertising Committee

Chairman—R. R. Gros, Pacific Gas and Electric Co.

Accounting Section

Report of General Chairman Accounting Section

By C. E. PEARMAN

Pacific Lighting Corporation

THE ACTIVITIES of the Accounting Section during the present Association year have followed the pattern established some years ago of having several small group conferences, each limited to the discussion of one general subject. All actions of the section are governed by an Executive committee, which is composed of the chief accounting officer of each company represented in Association work.

On November 15 and 16, 1944, there was a conference in Los Angeles on "Purchases, Stores, and Payables" under the leadership of H. G. Lawrence, purchasing agent of Southern Counties Gas Company of California. Approximately 20 representatives from eight companies were in attendance and entered actively into the discussions of the many subjects on the agenda. Only a few of those in attendance had primary interest in the subject of "Purchases" and for that reason the bulk of the discussion was directly related to the "Stores" and "Payables." It was recommended that the Accounting Section sponsor a conference for Purchasing Agents only and the Executive committee has scheduled such a conference for the coming Association year. Mr. Lawrence prepared a report of his meeting in considerable detail. This report appears elsewhere in this volume, and a close reading of it should be particularly beneficial to interested accountants who were unable to attend the meeting.

J. W. Vanier, special engineer of the Customers department of Southern California Gas Company, was host chairman of the next conference which was held in Los Angeles on February 14 and 15, 1945. The subject was "Commercial Problems." He led the discussion of 26 delegates from nine companies and reported for them that "There was material benefit in the free exchange of ideas in small group meetings of this nature." Discussion during the first day was limited to policies and practices effecting public relations and during the second day more detailed customer accounting subjects were on the program. Upon recommendation of Mr. Vanier, a paper was prepared for printing in the proceedings which will portray the application of a training program for commercial department functions. Also, discussion of the subject of interchange of credit information gave impetus to the work of a committee assigned to that problem during the previous Association year. Brief recommendations of the committee are also printed with the hope that member companies will take advantage of the idea even though the printed forms may not furnish the exact requirements. Commercial problems are so many and varied that the Executive committee decided to sponsor a conference on the same subject for the coming Association year.

The third conference sponsored by the Accounting Section was held in San Francisco on March 21 and 22, 1945, under the chairmanship of A. T. Kelly, payroll supervisor of Pacific Gas and Electric Company, on the subject of "Payrolls." The meeting was attended by 17 representatives from 12 utility companies. This conference and the minutes prepared by Mr. Kelly proved to be especially interesting because of the many problems confronting payroll accounting which have been brought about by government regulations during the last year or two. In his report he said: "The wide representation as well as the interest and ability of the delegates, provided a most thorough airing of payroll problems." The Executive committee again agreed that a conference on payrolls might be repeated to good advantage and accordingly made arrangements for such a conference next year.

Some years ago the Executive committee of the Accounting Section came to the realization that accounting problems of the gas utilities might be openly discussed with accountants engaged by electrical and other utilities, since the general principals of accounting and regulations are similar. It was recognized that several member companies of the gas association were engaged in electrical business as well as gas business. Therefore, it was decided to invite delegates from the electrical utilities to join our delegates in the conferences sponsored by the Accounting Section. This in turn resulted in invitations from the Pacific Coast Electrical Association to our companies to send delegates to their meetings. This year such invitations resulted in the presence of about 20 delegates from the gas industry attending each of two electrical association general conferences. The cooperative spirit of the electrical industry is apparent when it is noted that W. R. Davis, personnel manager of Southern California Gas Company was, by invitation, one of the speakers in the general session of the Electrical Association in the fall of 1944, and A. J. Gudgell, special accountant for Southern California Gas Company, upon invitation, presented a paper to the Accounting Group at the Spring conference of the Electrical Association. Mr. Gudgell's paper on "Company Manuals" is printed in the Gas Association Proceedings this year since it outlines in some detail a subject which should be valuable to companies interested in establishing or improving a system of presenting statements or instructions by this method.

Southern California Edison Company sponsored a conference in Los Angeles on April 18 and 19, 1945, on the subject of "Internal Auditing," to which the gas companies were all asked to send delegates. This may be said to be a practical expression of the cooperative spirit which was intended to be brought about by the original thinking of this committee as just briefly outlined. The conference chairman was F. C. McLaughlin, general auditor of Southern California Edison Company, Ltd., and A. L. Chavannes, of the same company, acted as secretary. There were 28 delegates present from eight gas and electric utilities. In addition there were two delegates from Lockheed Aircraft Corp., one from Arthur Andersen & Co., one from Southern California Telephone Company, and V. J. Hartley, managing director of the Pacific Coast Electrical Association, in attendance.

The agenda was followed in complete detail and valuable prepared comments were given by Harold Quinton, vice president of Southern California Edison Company, T. E. Cashion of Arthur Andersen & Company, and H. G. Kimball of Lockheed Aircraft Corporation. Mr. Quinton told the group what management expects of the internal auditors; Mr. Cashion outlined in detail how the work of the internal auditors can be integrated with that of the public accountants, and Mr. Kimball, president of the Los Angeles Chapter of the Institute of Internal Auditors, outlined the history and purpose of that Society. The organization of an internal auditing department was fully discussed from the standpoint of selection and training of personnel and the practicability of divorcing the activities of internal auditors from accounting functions. Likewise, considerable time was devoted to the scope and procedure of internal auditing, audit reports, and follow-up. The advantages of company manuals and their form and content was also discussed in some detail.

In conclusion, I should like to quote part of the last paragraph of Mr. McLaughlin's minutes: "The attentiveness and expressions of the delegates indicated that the conference was of deep interest and considerable value. Many of the topics, because of the limited amount of time, were not discussed in as much detail as some of the delegates would have desired. The general opinion seemed to be that future conferences on similar topics should be arranged at appropriate seasons." In accordance with that recommendation, this subject has been placed on the program of conferences for the coming year.

On June 11, 1945, a meeting of the Executive committee of the

Accounting Section was held in Los Angeles. This meeting was well attended by delegates who were not hindered too much by transportation difficulties. It was gratifying to note the presence of delegates from Salt Lake City, Utah, and Tucson, Ariz. Also two delegates from electrical utilities were present. For the most part, allotted time was consumed in the review of activities during the current year and in arranging for conferences to be conducted during the coming Association year. It is interesting to note that two of these conferences will be sponsored by combination gas and electrical utilities, one by an electrical utility and the fourth by a gas utility.

During the day R. M. Bauer, gas supply supervisor of the Pacific Lighting Corporation group of companies, presented facts concerning the desirability and availabiltiy of certain gas accounting statistics. There followed considerable discussion concerning the value of the American Gas Association released statistics and the possibility of the Pacific Coast Gas Association preparing some for their own use. However, no decisions or recommendations were made. Acting upon a recommendation made by the payroll conference, there was a committee appointed to investigate the possibility of approaching the United States Congress for a more liberal definition of constructive payment of wages. The committee is composed of Howard Boylan, vice president and comptroller of California Electric Power Company, chairman, and W. J. McCoy, treasurer and comptroller of Southern Counties Gas Company, and F. C. McLaughlin. general auditor of Southern California Edison Company, Ltd. It was also decided to have a two day meeting of the Executive committee at Santa Cruz on September 26 and 27, 1945, for discussion of subjects which by their nature might only be discussed by top accounting executives.

The chairman is especially grateful for the cooperation of the electrical industry during this Association year, and wishes to express his thanks to Clifford Johnstone, managing director of the Pacific Coast Gas Association, and members of the Executive committee for their assistance in making it possible to conduct such a full program during this period when there have been so many personnel and transportation difficulties. It is also very much in order to publicly acknowledge the excellent work done by the chairmen of the small group conferences, to whom any recognition of achievement by the Accounting Section is due.

Company Manuals – Form and Content Preparation and Revision

By A. J. GUDGELL

Southern California Gas Company

THE OPERATIONS of practically all business concerns are governed by established policies and procedures. The degree of development of such policies and procedures among businesses, of course, ranges from stages of minor development in some companies to highly developed and well planned activities which contribute greatly to the successful operation of other companies. One of the important factors of a carefully planned course of operations is the method used for the distribution of information relative to established policies and procedures to the employees concerned. There are many methods of distributing such information and obviously the adequacy of a particular method depends largely upon the character and size of the organization involved. We are all familiar with the various methods used for the distribution of policy and procedural matter within business enterprises, such as, verbal instruction, written notification by means of correspondence, more formalized notification in the form of general orders or indexed memorandums, the use of company manuals and several other means. Of these methods, possibly the most highly developed and most effective in large organizations is the maintenance of company manuals.

The following discussion is relative to the procedures currently employed by Southern California Gas Company in the maintenance of certain manuals which are titled "Standard Practices." Currently five separate standard practice volumes are maintained as follows:

Standard Practices	General
Standard Practices	Accounting
Standard Practices	Customers
Standard Practices	Distribution
Standard Practices	Sales

It is essential that the policies and procedures approved by management be reduced to writing and made matters of record. We believe that the maintenance of the above mentioned standard practices and the manner in which these volumes are maintained provides an efficient and desirable means for the recording and the publication within the Company of approved policies and procedures. While these five volumes have the common purpose of informing employees of standard practices they differ from each other in scope, coverage and style.

The volume titled "General" is maintained by the General Office and contains instructions and statements relative to the policies established by the management for the guidance of supervisors and other employees. Among the wide range of subjects included in this volume are statements of policy regarding the responsibilities of supervisors, the many conditions of employment, the custody and protection of company funds and property, etc. These, of course, are the broad policy matters which are applicable to the company as a whole.

The other volumes are departmental standard practices which set forth the policies and procedures related to the activities of the departments concerned. There are also some basic differences in these departmental standard practices. For example, the volume maintained by the distribution department contains instructions relative mainly to authorized departmental policies, while the detailed instructions relative to operating or mechanical procedures are supplied by job training programs and separate technical manuals. To state the foregoing in simple terms, the Distribution Standard Practices tell the employee "what should be done" but do not tell him "how it should be done." The Sales Department Standard Practices are similar to the distribution department practices inasmuch as emphasis is placed upon departmental policies rather than the routines concerned. The volume maintained by the Customers department contains instructions regarding established policies and procedures relative to that department's activities. This standard practice sets forth departmental policies together with detailed instructions regarding procedures for most of the activities involved but does not include detailed procedures for machine accounting which are contained in a separate technical manual. The Accounting Standard Practice volume differs from the other departmental standard practices, since it places full emphasis upon both accounting policies and detailed procedures. In this respect this volume closely approximates a procedural manual.

Since this is an accounting section meeting and since my personal activities concern the Accounting Standard Practices, I felt that it would be desirable to base this paper upon a discussion of the activities involved in the maintenance of the Accounting Standard Practice volume. However, I believe it is logical to cover the matter of coordination of the issuance of the various departmental Standard Practices at this point before confining this discussion to the accounting manual alone.

Coordination of the Issuance of Standard Practice Instructions

Due to the fact that our Company is maintaining five separate Standard Practice manuals and since the instructions contained in each of the volumes originate in separate departments, there is a definite need for coordination in the issuance of the instructions.

The Standard Practices General, or policy manual, is maintained under the direction of the official who also acts as coordinator of the issuance of the departmental instructions. The coordinator of standard practices must of necessity be broadly experienced in the many phases of the Company's operations. Our coordinator has had many years of experience in the engineering, rate and appraisal, controller's office and other general office functions of the Company. This official reviews the drafts of all standard practice instructions prior to their issuance.

Many advantages are realized as a result of the activity and efforts of the coordinator. In the first place, he determines whether

or not the instructions to be issued are actually necessary. He does not condone the issuance of standard practices for standard practices' sake. Trivial matters should usually be left to the judgment of employees and should not be made the subject of standard practices. He is available for consultation with departmental staff employees who prepare the instructions; he is instrumental in the calling of meetings of various employees for joint discussion and planning; he determines that all new instructions are in accordance with all established general policies of the Company which may be involved. He accomplishes these ends by carefully considering all instructions submitted and by exercising sound judgment based on his broad experience and qualifications. Through his activities management is assured that all instructions have cleared a central point, that appropriate tests have been applied and that departmental instructions at cross purposes are not being issued by the various departments.

A coordinator chosen without due consideration of his qualifications might readily prove to be merely a stylist with a desire to have all instructions written in a style similar to his own or he may prove to be a theorist with a tendency to inject his own theories into all departmental Standard Practices. In either case, the true value of coordination of instructions would be lost entirely. We believe that each department should adopt and use its own style; through experience each departmental staff has learned the best ways of conveying their thoughts to their own employees. In the matter of departmental theories and planning we believe that the departments should retain their individuality. The coordinator, of course, offers suggestions and consultation in the formulation of standard practices but does not attempt to dictate or influence departmental theories or practices, providing they are not in violation of established general policies.

Probably all of us have at one time or another been witness to certain trying situations along the following lines: Several departments of a company are found to be deadlocked in disputes over joint procedures for the handling of a certain phase of the company's business affecting the various departments. The needs and requirements of each of the departments have not been made known to the other departments concerned. No effort has been made to provide adequate instructions for the activity as a whole with the result that each department is working against the others with considerable irritation. In some cases the staffs have actually become hostile toward one another, and all efforts toward departmental cooperation have ceased to exist.

Under our current procedures a situation of this kind is usually satisfactorily settled in its early stages by the following process: Once the condition is known, the coordinator will call a meeting over which he will preside and will make sure that each department has the opportunity to state its requirements and preferences fully. Usually when all sides of the problem are known, reconciliation among the departments can be effected without difficulty. Each department then prepares its own standard practices which are coordinated and issued in the usual manner. I believe that the foregoing exemplifies one of the most important services rendered by the coordinator and it also represents an important function of standard practices, i. e., properly prepared and coordinated departmental standard practices do assure competent and harmonious inter-departmental procedures.

Accounting Standard Practices

The accounting manual is maintained under the direction of the General Auditor, the responsibility for this function being assigned to an employee of his staff. The basic purpose of the accounting manual is to place comprehensive instructions regarding standard accounting policies and practices within the reach of all employees concerned. Currently 148 manuals are in use. These are assigned to executives, department heads and line supervisors.

The Manual Binder and Instruction Sheet Form

We use Remington Rand, Style L, loose leaf binders bearing the company name and the title "Standard Practices—Accounting" on the covers. The title is also printed vertically on the binding edge so that the name of the volume is visible when the book is placed in the normal standing position. Pages for the manual are prepared by mimeograph reproduction on a specially printed loose leaf form. This form bears a printed heading which includes the title, "Standard Practices," and provides space for entry of the following detail:

Name of the issuing office
The effective date
The index number
The page number
The subject name
Reference to cancelled instructions

Border lines are imprinted in the body of these sheets which are so spaced that a border of 1½ in. is available at the right hand edge of the sheet. This space is used for marginal references to the subject matter contained on the page. At the bottom of the sheet are printed the terms "Distributed by" and "Distribution."

Manual Indexing System

A block of subject index numbers was assigned to the accounting manual. This block of numbers was then broken down into broad segregations of subject matter. As new standard practices are added to the manual appropriate index numbers are assigned. Decimal sub-divisions of a single number are used in indexing standard practices pertaining to the same general subject. For example, the Index Number 1941 was assigned to the general subject of "Stores Materials and Supplies." By use of decimal points the individual sets of instructions pertaining to Stores Accounting were indexed as follows:

1941.1 Requisition on Storeroom
1941.2 Pipe Issued and Returned to Storeroom
1941.3 Returned Material Delivered to Salvage Department by Stores
1941.4 Return of Material to Storeroom
1941.5 Service Station Deliveries
1941.6 Materials and Supplies Quantity Records
1941.7 Materials and Supplies Inventories

The Standard Practice sets are filed in the manual in the order of index number. The manual contains master index sheets setting forth an alphabetical list of subjects and the assigned index numbers.

Issuance of a new set of Standard Practices

New sets of Standard Practices are added to the manual as required and as authorized by the General Auditor. It is difficult to describe the exact steps taken in the preparation of a new Standard Practice due to variations in the requirements occasioned by different subjects. However, the procedure generally includes the following steps:

1. Preliminary discussion of the problems with members of the Auditing department and the supervisory staffs of other departments concerned.

2. Preparation of a preliminary draft of the proposed instructions. This draft (or an outline) is sometimes prepared by the supervisor of the section of the Auditing department concerned in the procedure to which the new instructions pertain.

3. Review of the draft by the coordinator, the Department Heads concerned and the General Auditor.

4. Preparation of a finished draft to incorporate changes and alterations in the text based on the results of the aforementioned review of the preliminary draft.

5. Final approval by the coordinator, the Department Heads concerned and the General Auditor.

6. Mimeograph stencils are then prepared from the final draft for reproduction on the manual forms.

The procedures followed in making revisions to existing instructions are similar to those described above for the issuance of new instructions.

Brief Sheets

Each new set of instructions and each set of revised pages of existing instructions are accompanied by a "brief sheet" when distributed. These briefs are prepared by mimeograph reproduction on plain 8½ in. by 11 in. paper. The sheets provide the receiver of the instructions with a brief of the contents of new instructions issued or the changes which have been made in current instructions, as the case may be. Obviously all employees are not directly concerned with all sets of accounting instructions. The brief sheets provide employees with quickly digested briefs of the contents of those sets of instructions which do not concern their particular activities, thereby saving the time which would otherwise be expended in detailed reading of many sets of instructions. Further, we believe that the brief sheets are particularly essential when existing instructions are revised since, in the absence of such a brief, the changes made in the instructions could be determined only by comparing the new pages for the manual with the superseded pages. Typical examples of the brief sheets are as follows:

The following brief was transmitted with a new set of Standard Practices relative to accounting for railroad transportation for employees:

BRIEF OF STANDARD PRACTICE 1964.1

Railroad Transportation and Pullman Fares

This is a new section of Standard Practice relative to railroad transportation for employees traveling on Company business. This section contains instructions for the acquisition of reservations and tickets, cancellation of unused Pullman reservations, accounting for costs of transportation purchased and refunds for unused tickets.

EFFECTIVE: June 1, 1945.

The following brief was transmitted with a group of revised Standard Practice pages:

BRIEF OF REVISIONS TO STANDARD PRACTICE 1928.1

Reporting of Miscellaneous Earnings

Section 10. Special instructions for reporting earnings from *transactions subject to "City" sales taxes.*

The title and text of this section have been revised to provide instructions for the reporting of earnings subject to both the City of Colton and City of San Bernardino sales taxes.

The revised instructions provide for the reporting of a separate "tax base" for sales of each of the cities concerned on the reverse of Form 14-3, "Miscellaneous Earnings Report."

The former requirement of a footnote to the tabulation indicating the amount of carrying charges included in the "retail" column has been deleted.

EFFECTIVE: April 1, 1945.

Distribution of Instructions

A mailing list of holders of accounting manuals is maintained on a set of 3x5 inch index cards bearing the names of employees to whom manuals have been assigned.

To guard against the possibility of having outdated instructions remain in the manuals after revised pages have been issued, superseded pages are recalled for destruction at the General Auditor's office. To provide for the recall of superseded pages and to aid in the distribution of new pages, we prepare a "transmittal sheet" by mimeograph reproduction on plain 8½x11 inch paper for each mailing of new pages for the manuals. To reduce the time expended in distributing new pages for the manuals, several sets of instructions are often distributed at one time. A typical example of the form of these transmittal sheets is as follows:

TRANSMITTAL SHEET—STANDARD PRACTICES
May 28, 1945

Mr..... Copy.....

Attached are the following Standard Practice sheets for your files:

1928.1 Reporting of Miscellaneous Earnings
Pages 8, 9 dated June 1, 1945

1964.1 Railroad Transportation and Pullman Fares
Title Page dated June 1, 1945
Pages 1, 2 dated June 1, 1945

1974.1 Taxes, Sales and Use
Title Page dated June 1, 1945
Pages 1 through 8 dated June 1, 1945

Will you please remove the following superseded sheets from your files and return them to this office attached to this Transmittal Sheet:

1928.1 Reporting of Miscellaneous Earnings
Pages 8, 9 dated January 1, 1945

1974-1 Taxes, Sales and Use
Title Page dated January 1, 1945
Pages 1 through 8 dated January 1, 1945

A. B. CATES, JR., GENERAL AUDITOR
Room 542, Flower Street Building
Location 50

The names of the holders of the manuals are entered on the transmittal sheets on the basis of the mailing list previously mentioned. The manual pages and brief sheets which comprise the current mailing are gathered into sets, the addressed transmittal sheets being stapled to the assembled sets for mailing.

To control the return of superseded sheets, the mailing date is entered by rubber stamp on the mailing list cards. Since the holders of the manuals are required to return the superseded pages together with the transmittal sheets, superseded pages received at the General Auditor's office can be identified by the transmittal sheet with which they are returned, and on this basis their receipt is recorded on the mailing list cards by checking off the appropriate mailing date. Holders of manuals who do not return superseded pages within a reasonable period are contacted and requested to return the pages concerned.

Extra Manual Pages

When the mimeograph reproductions of new manual pages are prepared, a few sheets in excess of the number of outstanding manuals are reproduced to provide a stock of extra sheets so that additional manuals can be assembled as required. This file of extra sheets is maintained in the order of index number. The stencils, after the original run has been completed, are placed on file, in the order of manual index number, and remain on file until superseded by new stencils subsequently prepared for revisions, or until the instructions are revoked.

Working Papers

All working papers used in the development of new instructions or the revision of existing instructions are retained in separate files by subject index number. The working papers include correspondence, preliminary and final drafts, accounting studies and analyses, memorandums, drafts of forms, and all other pertinent data which has entered into the development of the instructions. When filed, the working papers are supplemented by a set of the new manual pages which were issued. As a result of this procedure, a complete history of the development of each set of instructions, beginning with the original issue and continuing through each revision, is perpetuated in the working paper files. These files have proved to be of considerable value for the purpose of research and also provide the answers to the many questions which frequently arise regarding past practices and procedures, reasons and authority for change of practice, etc.

Classification of Accounts

I would like to mention at this point that a Classification of Accounts is also maintained under the direction of the General

Auditor. This volume sets forth the complete Classification of Accounts together with descriptive texts as appropriate. Currently 192 Classifications of Accounts are assigned throughout the system. New and revised pages for the Classifications are prepared and distributed, and superseded pages are recalled in a manner similar to that just described for the maintenance of Accounting Standard Practices.

Style in the Preparation of Standard Practice Texts

Since the basic purpose of the Accounting Manual is to provide employees with descriptive instructions regarding the performance of various accounting functions in accordance with established Standard Practice, we believe that the following rules should govern the writing of the manual texts:

1. The instructions should be written in plain language and should be carefully worded to preclude misinterpretation.

2. Instructions should be as brief as possible. Unnecessarily long, drawn out instructions often create confusion and certainly waste the time of the reader.

3. The elements of the subject should be presented in a logical sequence providing a "step by step" description of the procedures involved.

4. The preparation, use, routing and final distribution of accounting forms should be fully described.

5. Cross references to related instructions should be noted in the text whenever such reference will broaden the reader's perception and understanding of the subject and its relationship to the accounting system as a whole.

6. Each set of instructions should be sub-divided into several parts with subtitled and numbered sections as appropriate. A title page listing such subdivisions should be provided for each set of instructions so that reference to specific points may be made quickly and without difficulty.

Some of the Benefits Derived by the Use of Standard Practice Manuals

The maintenance of Standard Practice manuals, as described in the foregoing discussion, requires an annual expenditure of considerable amount. We believe, however, that the expense is fully offset by certain tangible savings and many intangible benefits resulting from the use of the manuals, some of which are as follows:

1. The manuals are actually special text books setting forth the principles of established procedures and policies which can be used extensively and profitably in the training of new employees.

2. The manuals are available to practically all employees for reference purposes and thereby contribute to better job performance.

3. Standard practices result in savings when an employee is transferred between Company locations in the same line of work, since the employee does not have to learn a new way of doing the same job.

4. Customers are accorded uniform treatment throughout the Company system.

5. The manuals provide the internal auditing staff with a "standard" by which conformance with the policies and procedures prescribed by the management can be gauged. If audit programs are used, such programs can be based largely upon the standard practice instructions.

6. Since new standard practices or revisions of current standard practices are not issued without appropriate management approvals, the management is assured that proper procedures are specified at all times. Variations in prescribed practice can be effected only through revisions approved by the management. On the basis of reports of the internal audit staff the management is informed of deviations from prescribed practices.

7. The manuals provide the Company's independent auditors with complete information regarding the Company's standard practices. Our Company has assigned a Standard Practice Accounting Manual to its independent auditors and new and revised pages are transmitted to them as issued.

8. Operating expenses can be minimized and Company funds and properties are better protected when operations are based upon carefully developed and well planned standard practices.

9. Standard Practice manuals save time. The Standard Practice manuals contain the complete current instructions regarding each subject. Employees making reference to the manuals can be certain that the instructions set forth are full statements of currently authorized procedure—there is no need to look further. Compare the time necessary to refer to a Standard Practice manual with the time which can be expended in examining vast files which usually exist when instructions are issued by means of correspondence, general orders or memorandums. Many of us have had some experience in searching bulky files in an effort to determine an up to date statement of a certain policy or procedure. I can recall cases where the search developed along the following lines: The employee located the original order; then to make sure that all amendments and revisions were reviewed, the file was searched for the period subsequent to the date of the original order. All went well and the first amendment was usually found quite early in the search. That offered no particular problem other than the reading of the amendment and a hasty review of the original order to be certain just how it had been altered. Usually several more amendments were discovered in the file and the employee became a little tired, but he still had a pretty good idea of the matter. However, there usually followed a few amendments of amendments which really complicated matters, with the result that the employee generally gave up in desperation and was probably justified in saying "To Hell With It" and then and there substituting his own ideas in lieu of the authorized procedure which he could not determine.

I realize that the foregoing is a rather exaggerated statement but the fact does remain that standard practices provide a better source of reference than can possibly be attained when instructions are issued by means of correspondence, general orders or memorandums.

Some Conclusions

If standard practices are to be effective it is necessary that they be kept up to date by the issuance of new instructions and revisions of existing instructions promptly as required. The Standard Practice manual should constantly set forth the full current requirements regarding each subject covered and employees should be expected to required to live up to them. There should be no half way measures. If strict adherence to a set procedure is not required it is best not to cover the activity with standard practice instructions. Similarly, if standard practices are issued and then found to be impractical they should be revoked or revised immediately.

The best standard practice instructions are seldom the product of an individual's thinking and planning alone. The writer should not be hidebound by his own ideas but should seek the best possible means of accomplishing the desired results by soliciting the ideas and suggestions of other employees to supplement his own; should carefully consider and evaluate them and then develop the final plan on the basis of the best of the suggestions advanced. I believe that the source of good ideas and worthy suggestions in most groups of employees is inexhaustable. The "man on the job" often has valuable ideas for the improvement of procedures which govern his activities. It is a rare case when a supervisor cannot suggest ways and means of improving some procedure with which he is concerned. The internal audit staff is a constant source of suggestions for the betterment of accounting procedures. This, of course, is a natural result of the internal auditors' direct contact with employees, the records which they compile, knowledge of cases where existing instructions are not producing intended results, knowledge of variances from prescribed practices and the reasons for such deviations.

During the course of my limited experience in the writing of standard practices, I have formed some opinions regarding the qualifications which I believe the employee responsible for the writing of the manual texts should possess. In closing I would like to enumerate some of these qualifications as follows:

1. The writer should have the ability to build a plan upon the usually brief instructions, recommendations or outline he receives from management relative to the new procedure to be developed.

2. He should be experienced in as many phases of the department's activities as possible.

3. He should be able to visualize a problem or procedure in its entirety in advance of the development and fitting together of its integral parts.

4. He should be able to express himself clearly in writing especially from the standpoint of description.

5. He should have the knack of stimulating joint discussion and thinking in his contacts with other employees in the development of procedures.

6. He should carefully consider the ideas and suggestions of his associates and, if he uses them, should give due recognition and credit to the originators and should never appropriate them as his own.

7. Finally, he should have a stout heart, for he will often overhear that very discouraging remark: "Who in Hell wrote this?"

Committee Recommendations Relative To Interchange of Credit Information Between Member Companies*

IN VIEW of an anticipated increase in the migration of customers upon termination of war activities in many Pacific Coast cities, the subject of interchange of credit and collection data between member companies was discussed at the 1944 Commercial Problems Conference and a committee was appointed to review the recommendations of a previous P.C.G.A. committee relative to this subject to determine if the practices previously recommended and adopted would be appropriate for current day conditions.

The committee on credits and collections at a P.C.G.A. meeting in 1924 passed a resolution, which was approved by the Board of Directors of the Association, recommending the exchange of credit information between member companies and the acceptance of a satisfactory payment record by one company as a basis for the establishment of credit by a company serving subsequently. To facilitate the exchange of such information, the committee also recommended the use of a standard form which was approved by the credit and collection committee at the P.C.G.A. meeting in 1925.

The present committee is of the opinion that the recommendations of the previous committees are still appropriate under present day conditions and finds that there is an increasing tendency on the part of many Pacific Coast utilities to waive residential meter deposits and utilize credit references more fully. It is recommended that a more simplified form be used which can be readily filled out and utilized by both utilities. The last line of the recommended form (Fig. 1) provides for deposit information so that the form could also be used for intracompany purposes in the exchange of information between districts. All information is contained on one side of the form so that a carbon copy may be retained by the sender.

It is also recommended that member companies expand the interchange of data to include collection assistance as well as exchange of credit data. This practice will not only aid member companies in the collection of delinquent closing bills but will also provide the currently serving company with useful credit information. The committee recommends the use of a sample form (Fig. 2) which minimizes clerical work on the part of the receiving utility. The committee is of the opinion that there would be no appreciable increase over current efforts if such collection assistance were requested only after the originating utility had exhausted every effort on its own behalf and limited such requests to accounts involving more than $7.50. This form is also designed so that it can be used for either intra or intercompany use and is perforated so that both an office and field copy are made available.

*Committee Members: Mr. E. T. Crick, Coast Counties Gas & Electric Co.; Mr. Grover S. Tracy, Pacific Gas & Electric Co.; Mr. E. J. Wright, Chairman, San Diego Gas & Electric Co.

CREDIT REQUEST

Date.....

To.....Office at.....

Street.....City.....

M....., applying for service at

states that service was previously received from you at the following address:

Street.....City.....

Please supply the information asked below and return this form to
A.B.C. Gas & Electric Company

Office at.....Requested by.....

Type of Service: Domestic ☐ Commercial ☐

From..... to.....

Credit Established by: Deposit ☐ Old Consumer ☐
Property Owner ☐ Guarantee ☐

Were bills paid promptly.....Closing bill due.....

(Our District Offices only will please give following information)

Deposit No.....Amt.....Still Good.....

Answered: Date.....Office.....By.....

FIG. 1. Committee Recommendations Relative to Interchange of Credit Information Between Member Companies.

A. B. C. GAS & ELECTRIC COMPANY

Palm City — 8/1, 1945
Division or District — Date

We will appreciate your collection assistance on the Closing Bill stapled hereto and captioned below.

Please reply on the prepared form attached.

Name H. A. Condon
Address 1234 Nat'l Ave.
City Palm City
Folio 1210-145
Amount $10.99

California Utility Co.
1148 Main Street
Newton, California
c/o Credit Department

Detach Here

Company—California Utility Co.
Division or District—Palm City — Date—8/1 1945

Harry A. Condon — 1210-145 — $10.99
Name — Folio — Amt.

☐ 1. Payment is promised and will be sent to you as follows:
☐ 2. Debtor located at forwarding address although not using service and not able to pay now. We suggest that you request us to check this after thirty days.
☐ 3. Cannot locate debtor and our Contract files do not show this person is receiving service.
☐ 4. Forwarding address is not in this Division-District.
(For use between district offices)
☐ 5. Remarks:

A. B. C. Gas & Electric Company
P. O. Box Number
City.....Zone.....State.....

NOTICE
This Form may be inserted in window envelope to return.

(Size 6¼x10½—Perforation 3½ in. from top)

FIG. 2. Committee Recommendations Relative to Interchange of Credit Information Between Member Companies.

Application of Job Training Manuals to Commercial Department Functions

By L. E. GREEN, V. C. PACK AND M. G. THOMAS

Southern California Gas Company

Part 1. The Purpose and Form of Training Programs

By L. E. GREEN

WAR emergency production pointed very soon to the need for a universal job training program on a scale never before encountered nor contemplated. The number nationally em ployed expanded quickly from 50 millions in 1941 to more than 62 millions while, at the same time, Selective Service removed from industry millions of the experienced, the skilled, and the more efficient workers. This critical need for a program for training new workers, and also for training new supervisors in the technique of training new workers, brought out a program by the Training Within Industry Service under the War Manpower Commission. This program was titled Job Instruction Training and is commonly refered to as "J.I.T." It is our purpose to review briefly an application of this job training plan modified to Commercial department functions.

There is a growing appreciation for the principles presented in this program. In the "Minutes of the Manpower Conference" reported in the 1943 Proceedings of this Association we find the conclusion: "The job instructor training program sponsored by the government is conceded to be excellent in theory but has little application to the utility industry. It was also conceded that there exists a definite need for a program for training men for supervisory positions." However, in 1944 the Proceedings Report of the Personnel Conference says, in part, regarding the Training Within Industry Program: "The reports of several companies were definitely enthusiastic . . . supervisors were seeing new possibilities in their jobs and had raised the question why such an effective tool had not been made available before."

J.I.T. is probably credited primarily because of the publicity and impetus given by the war effort and the success with which it was used during a national emergency. The men who developed the program undoubtedly not only contributed from their own experiences but borrowed from the best of many such programs. In his book, "How to Supervise People," published prior to this war, Alfred M. Cooper suggested four steps when teaching a man a new job, viz: Preparation, Presentation, Application, and Test. This is practically identical to the Prepare, Present, Perform, and Follow-up of the government program.

J.I.T. offers three "tools" as prime requisites of planned job training. These "tools" are Training Time Tables, Job Breakdown Sheets, and the 4-Step Method of Instruction. Briefly, one purpose of the Training Time Table is to determine who should be trained—on what job—by what date. When used in this manner it enables the supervisor to determine quickly if all functions are adequately covered by trained employees with alternates for vacation periods and relief for other absences. Another usage has been found to be of even greater value. A time table in the form of an outline may be used to indicate the order in which functions should be taught on any particular job, and the normal rate of progression to standard performance. By indicating in the outline the usual time to be spent in teaching each function of a job, the supervisor has an excellent "measuring stick" to determine the employees' relative ability to learn. He can adjust his teaching schedule accordingly. This is particularly important if several employees are grouped for instruction.

The preparation of Job Breakdown Sheets and the use of the 4-Step Method of Instruction are the foundation for the preparation and usage of job training manuals. For many jobs the Breakdown Sheet is only an outline for the use of the supervisor while in more complex functions, several or many sheets are put together to form a manual which may be made available to employees for the benefit of reference and review after the training period. It is quite generally conceded that this suggested planned approach to training a man on a new job is well adapted to production line repetitive functions and manual operations. Experience has also shown that the application of a prepared job training program to Commercial department functions is practical and productive of improved job performance. This technique has been applied without limitation to training Commercial department employees.

The advantages of a program of job training which calls for a prepared outline to be followed by the supervisor may be summarized as follows:

1. All important steps and "key points" are marshalled so the training takes an orderly, logical progression and no step is missed.
2. The operation is standardized and all employees receive the same training.
3. The preparation of an outline tends to develop the "best way" of doing a job by putting together selected steps after a study of the job has been made.
4. It is possible to improve the training program continually by adding important points as they come to attention or are recalled.
5. The supervisor necessarily gets in closer touch with detailed operations.
6. The employee gets into production sooner with full ability to perform the task.
7. A "refresher" course is provided for retaining workers.

This last is one of the more important advantages of a formalized job training program and is the basis for following-up and checking on the job performance, of not only new employees, but also those who have been on the job for an extended period. Experience has shown that most employees need a regular review of practices in order to maintain a high standard of performance. This is particularly true of those jobs involving customer contact.

It cannot be said that all supervisors have taken up the preparation and usage of job training manuals with equal enthusiasm or skill. In fact, some supervisors need to be convinced by the demonstrated success of their associates. In most cases after a supervisor has tried the procedure he realizes the value of a prepared program, particularly if he does the training job himself. The preparation of Job Breakdown Sheets requires practice before skill is acquired and some actual assistance may be necessary to get a supervisor started. Encouragement from top supervision is necessary; the first line supervisor cannot be expected to energize both the policy and the practice of such an important program.

Before discussing the use of training manuals in certain Commercial department functions the importance of properly introducing all new employees to the company and to the job should be emphasized. The first outline prepared for a job training program should cover the points of general information and instruction to be given all new employees. Before actual training begins a new man should know his employment status (regular or temporary), his salary rate, time and method of payment, and perhaps have a brief explanation of the required and optional payroll deductions. The top local supervisor might well cover these points of information with perhaps a few remarks about the Company, customer relations, and the line of supervision effecting the employee. The employee should have an opportunity to ask questions.

The supervisor next in line should see that the employee is conducted on a short trip around the office lay-out, and shown the employee's entrances, lunch room, and rest rooms. The line super visors who are seen daily on the job should all meet the new man. Each should cover a definite part of the orientation outline. Repetition is thus avoided with assurance that no important point is missed. Points of information which might appear on an Orientation Job Breakdown Sheet are:

The Work Schedule	1. Hours per day—per week. 2. Overtime, and payment. 3. Starting and quitting times. 4. Relief periods. 5. Lunch period.
The Official Bulletin Board	1. Employee's responsibility. 2. Type of information posted.

Relation of employee's work to others	1. Briefly the functions of the working unit.
Office conduct	1. Smoking. 2. Personal use of telephones. 3. Reporting absences.
General	1. Presentation of identification media. 2. Check on Driver's License—if required. 3. Discuss Safety—reporting all accidents.

The above outline is only suggestive of the application of prepared job training. Such an approach aims at giving the new employee all the necessary information to properly fit into the organization. Seeing the preparation made for him centers the man's attention on the training program to come and wins his respect for the Company and the type of supervision with which he has become associated.

In Parts Two and Three following are presented further applications of planned job training programs as applied to Commercial department functions. Two lines of work common to gas utility companies have been chosen. These are meter reading, which is repetitive but carried on with little immediate supervision, and customer telephone service, which is also repetitive but is subject to close supervision.

Part 2. A Training Program for Meter Reading

By M. G. THOMAS

THE APPLICATION of job training to field work such as meter reading must be based on a related and integrated program. Such a program must be designed to develop an employee who is unfamiliar with meter reading requirements into an experienced man who can meet varied field conditions and problems. As the first step in designing a simple and understandable training schedule, the information needed by the trainee must be set up in a logical sequence which can be readily taught and easily remembered. This program is built upon three distinct groups of training steps which are designated as Basic, Occasional, and General. A suggested outline which has been successfully used is as follows:

Basic	*Occasional*	*General*
Dial readings.	No consumption and locked meters.	Care and use of meter reader's equipment.
Making entries to meter sheet.	Post card readings.	Public contacts.
Valve and meter conditions, symbols, etc.	Re-read and vertification orders.	Safety and accident.
Meter locations.	Preparation and use of reader's report.	Use of company cars.
	Bookkeeping symbols.	Company policies and miscellaneous.
	Meter book maps.	

In planning a meter reading training program these three phases are used as the framework on which the specific instructions are based.

An outline of this type follows two princples: (1) emphasis on the fundamental operations, and (2) arrangement of material in the order of field frequency so far as possible. A job breakdown must be prepared for each subject listed showing the "important steps" and "key points." In addition a time table for the use of the supervisor must be developed to insure proper time allotment for each subject and to allow for practice periods at certain points.

Basic Operations

The first phase presents to the trainee those repetitive functions which are the "basic" operations in each individual process of reading a meter. Included in this group are locating the meter, reading the meter, computing consumption, and observing valve conditions. The supervisor adheres to his prepared job breakdown sheet as a guide in training. An example of such an outline used to teach a basic operation is as follows:

I. "BASIC" OPERATION—"DIAL READINGS"

Steps	*Key Points*
1. Brief explanation of a meter dial and how it operates.	1. Stress accuracy of the dial.
2. Read right hand dial.	1. Right hand dial turns clockwise. 2. Read number hand has passed. 3. Read "0" as a figure.
3. Read middle dial.	1. Turns counter clockwise. 2. Dial to the right governs reading. Middle dial hand does not reach next number until right dial hand passes "0."
4. Read left dial.	1. Turns clockwise. 2. Position of middle dial determines reading. Left dial hand does not reach next number until middle dial hand passes "0." 3. Watch closely; this is where most errors are made.

Supplementing the instruction sheet the supervisor uses a meter dial or a large card board facsimile to illustrate his point. Continual practice is given with one, then two, and finally with all three dials until the trainee gains familiarity and speed. This phase of the training is given first and is the fundamental part of the program since all succeeding instruction ties back to this basic function.

Occasional Operations

The second or "Occasional" group of operations may or may not become a part of each meter reading. Included in this group are the problems of inaccessible meters, previous erroneous readings, re-read meters, verification of reading, meter book maps, etc. This instruction must be placed as part of the superstructure of the program with a relationship developed to the basic information of how to read a meter. These operations are designed to complete the "mechanical" knowledge of the trainee and to give him all the specific information he may need to meet any field condition. A good example of an "occasional" operation is the preparation of a "verification" order.

II. "OCCASIONAL" OPERATION—
ISSUANCE OF A VERIFICATION ORDER

Steps	*Key Points*
1. Enter account identification on order	1. Obtain from meter sheet.
2. Fill in address, city and name as indicated.	1. House number, street name and city must be accurate. 2. Print.
3. Enter apartment or location.	1. Obtain from meter sheet.
4. Show meter number.	1. Provides identification.
5. Show meter location.	1. Enables "re-read" man to locate meter.
6. Describe reason for order.	1. Bad dog, can't locate, etc.
7. Sign, date, and enter office name as provided.	1. Identification.

As each additional procedure is explained, the trainee is given practice to coordinate the new information with that which he

has previously received. This enables him to recognize certain field conditions to which each new instruction applies. Such practice gives the trainee confidence and improves his speed and accuracy.

General Operations

The third group of procedures to be given to the trainee is "General" information which has occasional but specific use. The new employee is trained in safe practices, use of company cars, general public contact policies, and care and use of meter reading equipment. These instructions modify the operation of reading a meter. Their application is both specific and general, particularly in the case of policy matters or public contact which is illustrated as follows:

III. "GENERAL" OPERATION—PUBLIC CONTACT

Steps	*Key Points*
1. Be pleasant and courteous.	1. Feel and act friendly. This may be the only personal contact which the Company has with a customer.
2. Never argue with a customer.	1. Refer complaints to the office.
3. Show the customer how to read his meter, let him see his meter sheet.	1. A customer is entitled to information from his own meter sheet—no one elses.
4. The customer is our employer; treat him as such.	
5. Respect the customer's property.	1. Avoid new lawns. 2. Step over flower beds. 3. Go around hedges and fences. 4. The customer wants his yard unchanged.
6. Refer order requests to office.	1. Call leaks in to office unless very small. 2. Take order if necessary.
7. Be neat, clean and courteous.	1. Do not smoke on customer's premises. 2. To the customer *You* are the Gas Co.

The trainee is given a copy of each breakdown sheet as the particular operation is explained to him. These are used for reference during the training period and his first week or two in the field. Experience with this type of program will soon enable the supervisor to develop a test to be given at the end of the training course to measure the success he has had in making the information clear and intelligible.

Training Method and Follow-up

When the last of the general subjects has been explained, the trainee has a complete knowledge of possible field conditions which he may encounter and the steps he must take to meet each such condition. Experience in training has shown that a somewhat formal classroom method of instruction is most effective. Certain props such as a large meter dial facsimile, black board, blank meter sheets, valves, meter dials, cut away meter, etc., simulate field conditions as far as practicable. An overall classroom time of 25 to 30 hours is spent in training the employee followed by approximately 10 hours in the field under the supervisor's immediate direction.

Careful planning and successful application of a training program are vital but one phase still must be covered, the training follow-up. In meter reading this is accomplished partially through records of reading errors, subtraction errors, and missed readings, which are applied against the length of time the new employee has been in the field. These factors taken individually or collectively give the supervisor a daily check on the progress of the trainee and make it possible for him to give additional training where needed. When the training program is completed, the supervisor accompanies the trainee in the field for short periods and assists him until he is entirely capable of completing a satisfactory day's work. This permits the supervisor to review classroom work and to emphasize certain points as they are encountered in the field.

The value of the time spent to train properly can be measured by the shortening of the time required to develop a man from a trainee who is slow and inaccurate to an experienced meter reader who is able to complete the day's assignment within the allotted time with few errors.

Our experience leads us to believe that the basic principles of job training are universal: a well planned program, logically arranged with each subject treated separately and completely, followed by additional instruction to clarify points which are not entirely clear to the new employee. It is, however, each supervisor's responsibility to develop and maintain his own program adapted to the particular conditions found in his own locality and organization.

Part 3. A Training Program for Telephone Order Clerks

By V. C. PACK

THE FUNCTION of the Telephone Service Bureau is to answer all inquiries from customers concerning any phase of the Company's service policy. The telephone order clerk receives customer's requsts to turn-on or turn-off meters and to adjust appliances. She issues the necessary order and schedules the date on which the serviceman will complete the order. The telephone order clerk also answers a variety of inquiries including requests for amounts of bills and payment extensions.

INSTRUCTOR'S MANUAL
TRAINING PERIOD No. 2
CUSTOMER SERVICE ORDERS

A. Essential information from customer.
   1. Name and address.
   2. Location.
   3. Nearest cross street.
   4. Type of adjustment or work to be done.
      Learn to give customer simple facts about the operation of his appliances. If it is evident that a serviceman should make the adjustment, avoid unnecessary and confusing questions.
   5. Customer's telephone number.

B. Completion Schedule.
   Learn order completion schedule. Study order completion chart and Bulletins No. 141 and No. 119.

C. General Agents for claims. See Bulletin No. 138.
   If personal injury or property damage has occurred, report the information to General Agents, Local 1221, and show in "Special Instructions" on C.S.O., "Rep. to....., Claims."

D. "No Gas" orders.
   Whenever a customer reports "no gas" on premises for no apparent reason, check files and collection records to make sure he has not been closed for bills. In "Special Instructions" mark "O.K. Coll." with the name of the person who has given the O.K.

E. Use Appliance Manual for instructions on lighting and closing pilots and burners. Inspect appliances on main floor. See Bulletins No. 65 and No. 117. Offer to issue order for future completion even though appliance is relighted or made operative. The serviceman will check the appliance to prevent a similar occurrence.

F. If order received from cafe, restaurant, etc., to adjust equipment used for commercial cooking, connect customer to Local 8520 via three-way. Necessary orders will be issued by that department. See Bulletin No. 145.

PREPARE, PRESENT, TRY-OUT, FOLLOW-UP

FIG. 1. Subject matter discussed during training period No. 2.

INSTRUCTOR'S MANUAL
TRAINING PERIOD No. 2—QUESTIONS
CUSTOMER SERVICE ORDERS

1. What is the normal completion schedule for the following:
   a. Adjust appliance?
   b. No hot water?
   c. No refrigeration?
   d. No gas at range oven?
   e. Re-light range top pilot?
   f. Re-light furnace pilot?
   g. Appliance won't shut off—overheated?
   h. Slight leak at meter?
   i. Slight leak at range, water heater or Electrolux, noticed several days?
   j. Odor at appliance, only when in operation?
   k. No gas throughout premises?
   l. Hazardous leak?
2. Under what circumstances will the Company take care of a water leak at a water heater?
3. Explain how to light an Electrolux.
4. How is it possible to take care of a "no refrigeration" or "no gas oven" call without issuing an order for today's completion?
5. What is a "recurring order"?
6. What is general procedure to:
   a. Turn off water heater that is out and blowing?
   b. Re-light water heater?
   c. Re-light furnace?
7. What does "O.K. Collections" mean and when is it used?
8. How do we distinguish between an iron meter and a tin meter?
9. What order form is used to change meter dial glass for iron meter?
10. Where do we obtain meter number to repair broken dial glasses?

FIG. 2. Questions used to test employee's progress during training period No. 2.

INSTRUCTOR'S MANUAL
TRAINING TIME TABLE

The following is a guide toward an equitable distribution of daily time during the training period.

8:00 A.M.—9:15 A.M. Review previous day's work.

9:15 A.M.—10:30 A.M. Trainee answers all calls on which she has been instructed. Instructor handles all others.

10:30—Lunch Hour. Discuss particular calls handled previously. Introduce new work and answer trainee's questions.

Lunch Hour—4:00 P.M. Discuss new work. Instructor asks questions. Set up practice calls.

4:00 P.M.—5:00 P.M. Trainee answers customers' calls. Discuss uncertain parts of procedure.

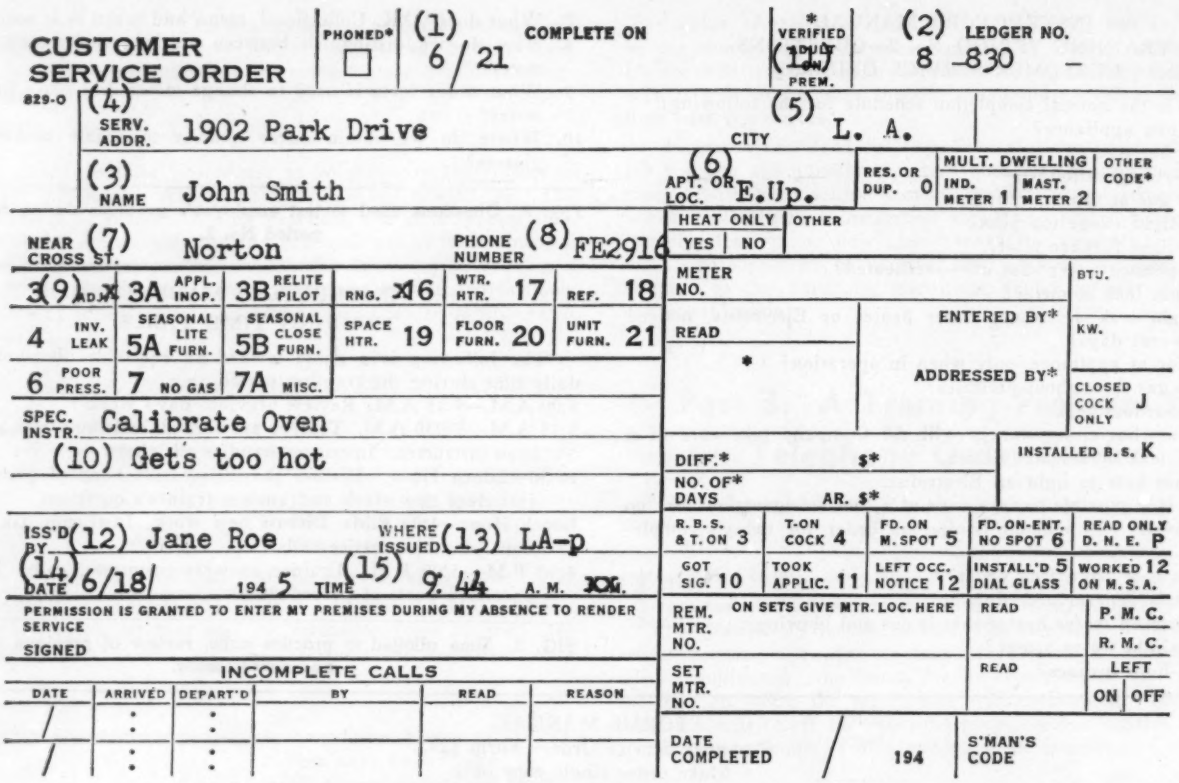
FIG. 3. Time allotted to practice calls, review of previous training and new training.

FORMS MANUAL
Customer Service Order—Form 829 L
Make order single copy only

Paragraph numbers refer to numbered items on sample orders	*Key Points*
1. *Complete On*—Show month and day. Follow Order Completion Chart and Bulletin No. 141 as closely as possible.	1. Special conditions, such as illness or infant, may place order ahead of schedule.
2. *Ledger No.*—Use reading section and streets segment No. as shown in Index book. If for outside Central Division, show district name.	2. R.O. (recurring order), when used, should be placed in extreme right corner of this space.
3. *Name*—First name or initials and last name of customer in whose name the account is carried.	
4. *Service Address*—House number and complete street name, including St., Ave., Dr., etc.	4. Street name should always be written in full. Repeat address back to customer.
5. *City*—Give name or abbreviation of city or post office designation.	5. Index book contains correct post office designation.
6. *Apt. or Location*—Location if other than residence; as Apt. 2, R. Hse., W. Up., etc.	6. Review apt. house service for 7 or more units.
7. *Near Cross St.*—Cross street is preferred, although nearby parallel street is acceptable.	
8. *Phone No.*—Show customer's telephone number or "None."	8. Will be used for follow-up if wrong address.
9. *Check Squares*—"X" the applicable squares to eliminate Special Instruction detail.	9. e.g., checking "Appl. Inop." and "Refr." would eliminate writing "No Refrigeration" below.
A. Types of C.S.O.'s.	
(1) Adjust—To be used with one or more of squares 16-21. Ordinarily Schedule "C" Completion.	
(2) Investigate Leak—Check particular appliance if possible.	(2) If hazardous conditions involved, such as "water heater out and blowing," Schedule order "A-1." Use appliance manual to help customer close appliance.
(The other five major uses of this order are also explained.)	
10. Other or Special Instructions—For information that cannot be conveniently checked above, as "Calibrate oven," "Noisy meter," etc.	10. Saves time and helps serviceman. Helps Dispatch Office when routes are overloaded.
11. Verified Adult on Premises.	11. Make sure an adult will admit the serviceman.
12. *Issued By*—Order receiver's last name (written). If telephoned from another department, list name of person phoning and order receiver's name.	
13. *Where Issued*—The abbreviation, "L. A." followed by "p," indicating order received at Los Angeles by telephone.	13. LA—C to indicate Los Angeles counter. LA—M to indicate Los Angeles mail.
14. *Date*—Month, day and year order received.	
15. *Time*—Time of day order received.	15. Cross out A.M. or P.M., whichever is not needed.

BE SPECIFIC—THE SERVICEMAN DOES NOT CARRY A CRYSTAL BALL

FIG. 4A. Items filled in on Customer Service Order.



CUSTOMER SERVICE ORDER

PHONED* ☐ | (1) COMPLETE ON 6/21 | * VERIFIED PREM. | (2) LEDGER NO. 8-830

829-O

(4) SERV. ADDR. 1902 Park Drive — CITY (5) L. A.

(3) NAME John Smith — APT. OR LOC. (6) E.Up. — RES. OR DUP. 0 — MULT. DWELLING: IND. METER 1, MAST. METER 2 — OTHER CODE*

NEAR CROSS ST. (7) Norton — PHONE NUMBER (8) FE2916 — HEAT ONLY: YES / NO — OTHER

(9) ADJ. X	3A APPL. INOP.	3B RELITE PILOT	RNG. X16	WTR. HTR. 17	REF. 18	
4 INV. LEAK	5A SEASONAL LITE FURN.	5B SEASONAL CLOSE FURN.	SPACE HTR. 19	FLOOR FURN. 20	UNIT FURN. 21	
6 POOR PRESS.	7 NO GAS	7A MISC.				

SPEC. INSTR. Calibrate Oven

(10) Gets too hot

METER NO. — BTU. — READ * — ENTERED BY* — ADDRESSED BY* — KW. — CLOSED COCK ONLY J — DIFF.* $* — NO. OF* DAYS — AR. $* — INSTALLED B.S. K

R.B.S. & T. ON 3	T-ON COCK 4	FD. ON M. SPOT 5	FD. ON-ENT. NO SPOT 6	READ ONLY D. N. E. P
GOT SIG. 10	TOOK APPLIC. 11	LEFT OCC. NOTICE 12	INSTALL'D 5 DIAL GLASS	WORKED 12 ON M. S. A.

ISS'D BY (12) Jane Roe — WHERE ISSUED (13) LA-p

(14) DATE 6/18/ 194 5 — (15) TIME 9.44 A. M. XX

PERMISSION IS GRANTED TO ENTER MY PREMISES DURING MY ABSENCE TO RENDER SERVICE

SIGNED

REM. MTR. NO. — ON SETS GIVE MTR. LOC. HERE — READ — P. M. C. — R. M. C.

SET MTR. NO. — READ — LEFT ON / OFF

INCOMPLETE CALLS

DATE	ARRIVED	DEPART'D	BY	READ	REASON
/	:	:			
/	:	:			

DATE COMPLETED / 194 — S'MAN'S CODE

FIG. 4-B. Items filled in on Customer Service order.

Thus, to perform satisfactorily in the Telephone Service Bureau, the employee must acquire a broad general knowledge of the company's operations. She must learn to diagnose the urgency of customers' requests for service in order to state definitely when a serviceman will be dispatched. If the customer is willing to try, and many of them are, the employee must be able to instruct her over the telephone to light the range oven, turn off an appliance, etc.

The employee must control the conversation, to obtain the essential information in the shortest possible time; yet make the customer feel our genuine interest in the problem. It is necessary that she learn the use of some 30 dissimilar forms. Should the customer's request be for a service not furnished by the company, the employee, tactfully and courteously, must so inform the customer, and then assist her to obtain the services of a plumber or service agency.

Due to the complexity of the duties involved in this job, it is plain that the general principles of J.I.T. production-line training cannot be applied as originally prescribed. The application of these principles, however, is found in the break-down of the job; consequently, "job break-downs" have been prepared for each phase of the telephone order clerk job. Grouped together they provide a Master Job Manual which consists of the Instructor's Manual, the Forms Manual, the Conversations Manual and the Appliance Manual.

The Instructor's Manual outlines not only the material to be covered during the course of training, but also the sequence in which the instructor presents that material to the new employee. The other Manuals are used during the course of instruction and for reference on the job thereafter.

These Manuals are prefaced with suggestions for self-improvement. Each job break-down lists the "Important Steps" and the "Key Points"; and wherever possible, samples or pictures are used to illustrate the explanation.

The use of these Manuals by the instructor and the trainee eliminates the risk of spending too much time on subjects of minor importance, of including extraneous material, and of carrying the training course past a practical limit. They provide on-the-job training with visual education.

In addition to the general orientation outlined in Part I of this paper, particular emphasis is placed on the relation of telephone service to the public and to the other departments which will be contacted from time to time.

As the new employee moves into the training program, "presentation" of the material is, to some extent, combined with "try-out the performance." The training course is divided into the following six periods:

Period 1. Gas production and distribution, territory served, and use of the telephone equipment.

Period 2. Appliance service orders.

Period 3. Bookkeeping calls, computing gas bills, deposits.

Period 4. Payment extensions.

Period 5. Turn-off meter orders and turn-on meter orders.

Period 6. General Inquiries and Street Department Orders.

Each training period consists of a definite phase of the work. Any one period ties into the next by natural progression starting with a general description of the company and the telephone equipment, to the more frequent types of orders and requests; thence to the relatively difficult and infrequent customers' inquiries.

The subject matter discussed during Period No. 2 (appliance service orders) and the questions which are used by the instructor to test the employee's progress are shown in Figs. 1 and 2. This period is illustrated because of its brevity. If the trainer is satisfied with the employee's answers to these questions, practice calls are set up to eliminate fear and to develop the trainee's confidence in the procedure just studied. The instructor takes the part of the customer, and the trainee takes the order or answers the inquiry. The time allotted to these practice calls, to review previous training, and to new training is controlled by means of the training time-table shown in Fig. 3.

During successive training periods the employee handles all calls with which she is familiar and the instructor, by use of a "double-jack," answers customers' requests that have not yet been covered. At the completion of the sixth period, the trainee is expe-

rienced in practically every type of request and graduates to a telephone position of her own.

Throughout the six periods the trainer has referred to the various Manuals so that the trainee may realize that there are few, if any, problems that are not explained. This not only assists in the instruction, but also impresses upon the employee the fact that the Manuals will be available for use at all times.

The Forms Manual illustrates the various orders for service, mail notices, interdepartmental forms, etc. Each of the forms is pictured and described; some because they are issued by the employee, and others because they help to understand the customers' requests. Sample orders show the items to be filled in which are cross-indexed to the Important Steps. Key Points, where necessary, call attention to the need for special care.

The items that are filled in on customer service orders are illustrated in Figs. 4-a and 4-b. These sample forms emphasize the need for specific information, not only for use by the Service department, but also for related Commercial department functions.

Similarly, in each of the six periods of training, reference is made to the Conversations Manual. Approximately 100 typical conversations are catalogued. These conversations, presented in job break down form, illustrate technique by means of differently worded phrases or by variations of the leading questions. The important features of a conversation such as interest in the customer's problem, control of the conversation, and politeness are emphasized. Key Points again illustrate the need for special care. A typical conversation wherein the customer requests a range adjustment is shown in Fig. 5.

After the employee has absorbed the "Present and Try-out" portions of the training course, she attends a series of eight meetings to learn appliance characteristics. We are fortunate to have available the Customers Service department training staff to conduct these meetings. Through actual contact with the appliances the employee becomes familiar with valve locations, automatic shut-off devices, etc., on the various appliances. This instruction enables her to diagnose the customer's complaint to determine if a serviceman is necessary or if it can be temporarily corrected by the customer and a serviceman dispatched later.

The material presented during these meetings is condensed into the Appliance Manual mentioned previously. The types and makes of the more commonly encountered gas ranges and automatic gas water heaters are listed alphabetically. The location of the automatic shut-off valve, main burner and pilot valves, and thermostats are described. For example, to restore service to a particular range oven the Appliance Manual reads:

> "The automatic shut-off safety button is on the right wall of utility drawer. On some models utility drawer must be removed because button is under utility drawer. If separate broiler, first button controls oven and second button controls broiler."

Included in the Manual are instructions to light the Servel Electrolux burner and to defrost the unit. Essential information regarding space heaters and unit heating systems is shown, not for the purpose of giving telephone instructions to customers, but to determine the urgency of the customer's request. General information regarding gas mains and gas service lines also appears.

The Appliance Manual, coupled with the eight meetings as an adaptation of "on-the-job training," results not only in rendering immediate service to the customer, but also in a saving of manpower in the field.

The "follow-up," without which all training programs fail, guides the progress of newer employees and maintains a high quality of work of experienced employees. Three types of follow-up are employed:

1. Monitoring of conversations.
2. Periodic review by instructors.
3. Recording and play-back of conversations.

Supervisors and instructors use equipment furnished by the Telephone Company to monitor conversations of all employees. The monitor form (Fig. 6) is used while listening to a conversa-

CONVERSATIONS MANUAL

Sample Conversation—Adjust Range

Important Steps	*Key Points*
Oper.: Miss ..... of the Southern California Gas Company.	To the customer *you* are the Company. The friendliness and confidence in your voice determines his attitude toward our Company.
Cust.: May I have the Service Dept.?	
Oper.: This is the Service Bureau. May I take an order for you?	
Cust.: I'd like to have my range adjusted.	
Oper.: May I have your name and address, please?	
Cust.: This is Mrs. O. D. Jones. I live at 5835 Malabar Street.	
Oper.: Mrs. O. D. Jones. Is that 5835 Malabar Street, in Los Angeles?	Be sure to obtain first name or initials.
Cust.: No. That is in Huntington Park.	
Oper.: Is that a court or an apartment, Mrs. Jones?	Rising inflection.
Cust.: Yes; an apartment—Apt. 104.	
Oper.: That is Apt. 1-0-4. May I have the nearest cross street to that address?	
Cust.: Slauson Avenue.	
Oper.: May I have your telephone number, please?	Will be used for follow-up if address is wrong.
Cust.: My telephone number is DR-0432.	
Oper.: Is it the top burners or the oven that needs adjustment?	Be natural, a stilted manner kills our helpfulness.
Cust.: It's the top burners. They do not burn evenly and the flame is yellow.	
Oper.: We'll be glad to have a serviceman call on Wednesday to adjust the range for you. Will there be an adult on the premises between 8:30 and 5:00?	Specify working hours 8:30 and 5:00 p.m. and emphasize need for an adult to be on premises.
Cust.: I'll be here all day. Thank you a lot.	
Oper.: You're welcome and thank you for calling. Goodbye.	

Be sure to show in special instructions which part of the range needs adjustment. If the oven gets too hot, not hot enough, or does not hold heat at temperature setting, issue an order to "Calibrate oven." If the flame does not burn evenly, smothers, or is yellow, issue an order to "Adjust oven."

FIG. 5. Important features of a typical conversation to adjust range.

MONITOR RECORD—TELEPHONE SERVICE BUREAU

OPERATOR _____ DATE _____ TYPE OF CALL _____

Cust. Name: _____ Address _____

	Tally			REMARKS
1. USE OF CUSTOMER'S NAME	///			
2. USE OF FILL-IN WORDS:				Good Personalization
I see	/			
Well				
Oh				Opening phrase too fast
All right				
Uh huh	//			
Oh yes				
Yes				
I understand				
		Yes	No	
3. CONTROL OF CONVERSATION				Discussed problem before getting name & address
Lead Conversation		X		
Obtain Customer's Problem		X		
Obtain Complete Information			X	
Alert on Names and Addresses			X	
Correct Answer or Solution		X		use "range"-not "stove"
Definite		X		
4. VOICE IMPRESSION				
Modulated—Interested		X		
Listless—Mechanical				
5. VOICE CONTROL				Rephrase questions when customer hard of hearing
Loud				
Timid				
Too fast		X		
Distinct				
		Good	Fair	Poor
6. COURTESY		X		
7. PHRASEOLOGY & GRAMMAR			X	
8. CUSTOMER'S REACTION		X		
9. RATING			X	

FIG. 6. Monitor form to record technique faults and judge conversations.

tion to record technique faults. Courtesy, conversation control, customers' reactions, etc., are judged. Each conversation is rated good, fair or poor.

When a sufficient number of conversations have been monitored to establish a pattern, the instructor reviews this work with the employee and suggests necessary improvements. For newer employees this is used in conjunction with a training follow-up chart. Three such training follow-ups provide a complete review of the training course. Fig. 7 illustrates the training follow-up No. 1,

INSTRUCTOR'S MANUAL

TRAINING FOLLOW-UP No. 1

1. Check at monitor board for clearness on opening phrase. Watch for talking too fast and too loud.
2. Check for proper courtesy and use of customer's name.
3. Review questions for all periods in Instructor's Manual. Make sure each question is thoroughly understood before going to next question.
4. Alternate questions with performance for each training period.
5. Ask for questions regarding procedure or routine that is not thoroughly understood.

FOLLOW-UP TIME TABLE

1. Listen to trainee's calls at monitor. (Approx. 1 hr.)
2. Listen to calls at trainee's position. (Approx. 15 min.)
3. Perform at position. Trainee listens. (Approx. 30 min.)
4. Listen and follow-up with trainee at position. (Approx. 3 hrs.)
5. Listen with trainee at monitor. (Approx. 30 min.)
6. Listen and follow-up with trainee at position. (Approx. 3 hrs.)

FIG. 7. Training Follow-Up No. 1 and Time Table.

which includes a time-table to guide the instructor for quick but sure results.

Recordings of the new employee's conversations are made at monthly intervals. Experienced employee's conversations are recorded at less frequent intervals, depending mainly upon their need. It is rarely necessary to point out errors in conversational habits or voice mannerisms since telephone technique and other phases of telephone service are audibly apparent. Employees hearing their own voices are painfully aware of their own inadequacies and often make the necessary suggestions for self-improvement. The recordings also provide a very definite record of the employee's progress.

Our experience with the application of this planned training program to the Telephone Service bureau has been gratifying because of a noticeable improvement in employee satisfaction and a definite betterment of customer relations. It has shortened the period of training from 14 days to approximately five days. Through it we have standardized procedures and reduced labor turnover due to inability of employees to perform the work.

CONCLUSION

No attempt has been made to present the job training manuals as actually used on these two job assignments. This total discussion intends only to indicate the success with which prepared job training programs are being used on clerical, semi-clerical, and customer contact operations. Further information regarding the complete details of these job training manuals will be furnished on request.

Manufacturers Section

Report of General Chairman Manufacturers Section

By E. T. HOWARD

General Controls Company

JUST one year ago, upon being elected General Chairman of the Manufacturers Section of the Pacific Coast Gas Association, I made the statement that I felt I would have the proud honor of being the first postwar chairman of our Manufacturers Section. With V-E Day and V-J Day now behind us, it goes without saying that all rejoice with me in the fulfillment of that hope.

Any report of the activities of our appliance and accessory manufacturers must be viewed in the light of conditions which have prevailed during this past year. Under the stress of the war emergency, the activities of our members along lines of their normal production have been curtailed or completely suspended, and many, if not most of our members, have devoted their talent and their energies to the production of goods for war in a way which has brought for them numerous bestowals of the Army and Navy "E" emblem. I am sure we can all be proud of the part which our members have played in this war emergency. To those of the Manufacturers Section and of the gas utility companies who have given so unselfishly of their time and effort during this trying period, we extend our thanks and appreciation.

We can point with pride to the known great contributions made by our members to the war effort. The deep thinking, planning and resourcefulness shown during this period leaves us fully prepared now that we are crossing the threshold into the postwar future. Trials and tribulations of readjustments and total reconversion lie immediately ahead, but we can face these with determination and confidence.

Notwithstanding their war activities, our manufacturers have devoted time and thought to the problems of the gas industry. During the year our several Divisions held 13 meetings which were well attended, and at which constructive and forward-looking programs were developed. Our Executive Committee, in whose hands rests the direction of the affairs of our Section, has held seven meetings at which the business of the Section was carried forward. May I take this opportunity to express my thanks to the members generally, and to the members of the Executive Committee particularly, for their splendid cooperation and their willingness to contribute time and effort to the industry's problems, when their time and efforts were so much in demand for war activities.

Four Product Councils

I think one of the outstanding accomplishments of the Section has been our participation in the work of the four product councils, developed under the direction of W. M. Jacobs, chairman of the Pacific Coast Gas Association Sales and Advertising Section. These councils were designed as a forum before which the problems of the several product groups—gas water heating, space heating, range and refrigeration, and gas commercial cooking equipment—might be discussed by representatives of the gas utility companies and the interested manufacturers. Six council meetings have been held and considerable results have already been attained.

Notable was the creation of the sizing chart for automatic storage gas water heaters, a chart covering minimum recommendations to meet normal, average domestic hot water requirements. The purpose of the chart is to encourage more adequate water heater sizing, and the minimum recommendations have been endorsed by utility companies and manufacturers generally in the area of the Pacific Coast Gas Association. Arrangements are being made to feature the sizing chart recommendations in advertising by the utility companies, manufacturers and the Association, and it is expected that the program will be given enthusiastic support by the water heater dealers. Several other worthwhile recommendations are now being discussed by the various councils, and it is hoped that their work will be carried on as part of the activities of the coming year.

In common with many other industries our appliance manufacturers have devoted much thought to standardization of their products, and in this connection our Pacific Coast members have cooperated fully with special committees which are giving the matter nation-wide study. It is strongly urged that future work be done in this regard.

The value of exhibits by manufacturers at industrial and home shows and similar expositions has always been a matter of conjecture, and the subject of cooperative exhibits to be participated in by manufacturers and utility companies is being seriously considered. Your Executive Committee feels that such exhibits would tend to bring more forcibly to the minds of the buying public the scope and importance of the gas industries, and that much more might be accomplished through such cooperation than by individual exhibits. Also, there might be a considerable saving in space and manning costs, and the cost could be distributed on some equitable basis by the participating individual manufacturers and utility companies. It is recommended that this matter be further discussed in Division meetings in order that some understanding can be reached in the not too distant future.

Domestic Gas Research Conference Held on Pacific Coast

The Pacific Coast was again favored this year with an American Gas Association conference on Domestic Gas Research, which conference was held at the Ambassador Hotel in Los Angeles on July 26-27. This was, in many respects, similar to the first such conference which was held here in March, 1944, but this year there were no exhibits. O.D.T. travel regulations necessarily limited the attendance, with the result that of a total registration of 141 persons, there were only nine from territories outside the Los Angeles metropolitan area, and these nine included the four A.G.A. representatives who were here from New York and Cleveland to handle the meeting and present the discussion subjects. The broad interest of local manufacturers was evidenced by the fact that 36 manufacturers were represented by 86 individuals. Both the general and panel sessions were well attended, with much favorable comment from those in attendance on the manner of presentation and on the benefits which might be derived from this type of conference. To the American Gas Association, the Pacific Coast Gas Association, and to those others who made this conference possible, we extend our sincere thanks and express our hope that we may be favored with similar conferences in the future.

Relations with A.G.A.E.M.

Our relations with A.G.A.E.M. during the past year have been most cordial. The reports from Leonard Macomber, Washington representative, have been prompt and helpful. Meetings of A.G.A.E.M. Divisions and Board of Directors have been well attended by Pacific Coast Manufacturers, and I feel that much has been accomplished to foster a better understanding among the members nationally.

One of the great disadvantages under which Pacific Coast members of A.G.A.E.M. operate is the time and expense involved in

attending meetings held in the East and Middle West. As a result, our Pacific Coast group is inadequately represented at most of these meetings and our members naturally have felt that their opinions have not been given proper recognition. To correct this situation, we have, during this past year, arranged with A.G.A. E.M. for voting by mail on all controversial subjects which might be under consideration, thus giving our Coast members equal voice with members more favorably located. This is a forward step and I am sure will be reflected in a still more cooperative attitude on the part of our members here on the Pacific Coast.

Another matter which has caused considerable annoyance has been the inability of our Pacific Coast group to be adequately represented on the various committees of A.G.A.E.M., all of whose meetings are held in the East and the Middle West. This situation has also been corrected by an arrangement by which alternate committee appointments can be made where necessary to meet the convenience of our Coast members and to more nearly insure representation from this territory in these committee deliberations.

At the suggestion of Lyle Harvey, A.G.A.E.M. President, that Association has elected Carl Swigart as a third alternate director from the Pacific Coast, to serve in the event that less than two West Coast directors or alternates were available for meetings of the Board.

The American Gas Association national advertising program, to which contributions have been made by A.G.A.E.M. members, is progressing satisfactorily. Representatives of four manufacturer members are serving on the copy committee, one of these being our own Frank Packer, giving further assurance that the best interests of all Divisions of our industries will have proper consideration.

Early this year our Manufacturers Section extended an invitation to A.G.A.E.M. to hold its first postwar convention on the Pacific Coast. At that time, Leigh Whitelaw's response was that the matter would be given consideration by the Board of Directors at the proper time.

Further efforts will be made by our Section to secure favorable action, as all who attended the previous convention here in 1939 remember it as one of the most successful ever held.

In closing this report, I wish again to thank all of the members serving with me on the Executive Committee for their splendid cooperation and support. I also wish to thank Clifford Johnstone and Carl Swigart for their invaluable assistance. Reiterating Bert Sutton's closing remarks of last year, let me also thank Elroy Payne for continuing to make available the time of Frank Packer, whose efforts on behalf of our Pacific Coast manufacturers have accomplished so much for all of us.

Election of Officers*

THE NAMES of the following representatives of Class B members were placed in nomination by the Nominating Committee and by motion duly made and seconded were unanimously elected.

For General Chairman: E. T. Howard, General Controls Co.

For General Vice Chairman: Henry Honer, Western Stove Co.

Accessories Division

For Chairman: T. T. Arden, Grayson Heat Control Ltd.
For Vice Chairman: M. M. Kennedy, Domestic Thermostat Co.

Heating Division

For Chairman: C. A. Gabriel, Monarch Heating Co.
For Vice Chairman: L. M. Hull, Hammel Radiator Co.

Range Division

For Chairman: H. F. Larkin, O'Keefe & Merritt Co.
For Vice Chairman: E. J. Hinchey, Jas. Graham Mfg. Co.

Water Heater Division

For Chairman: Claude Ballinger, Republic Heater Co.
For Vice Chairman: L. H. Lanssen, Hollywood Water Heater Co.

Directors of A.G.A.E.M.

E. T. Howard and Henry Honer, with C. A. Gabriel and Claude Ballinger as alternates.

*Nominating Committee: F. W. Lawson, Chairman, R. V. Davis, F. E. Elliott.

Sales and Advertising Section

Report of General Chairman Sales and Advertising Section

By W. M. JACOBS
Southern California Gas Company

AT THE OUTSET of this Association year, it was hoped that the Sales and Advertising Section would have an opportunity to be instrumental in developing plans for our industry's return to normal sales and promotional activities, and even to see some of these activities re-established during the year. Accordingly, "Reconversion to Sales" was our theme. The course of the war and limitations on industrial reconversion, however, have permitted only partial realization of this objective.

The Section's activities were divided into three general groups: Home Service, Domestic Sales, and Industrial-Commercial Sales. This parallels the successful form of organization used in recent years.

Home Service

The Home Service group, under chairmanship of Miss Mercedes Bates, has developed an unusually comprehensive program in light of the reduced Home Service staffs in the operating companies and their need to minimize the number of meetings because of travel conditions.

One conference, a "Home Service Workshop" meeting, was held in Los Angeles in the Spring in cooperation with the Home Service Committee of A.G.A. We were fortunate in having Miss Colleen Fowler, chairman of that committee, in attendance. Many questions of practical import, of both wartime and post-war nature, were considered. All who attended freely agreed that this conference was a very constructive one.

The Committee undertook resumption of Home Service News Letters, three of which were issued during the year. These have been the means of disseminating among home service women and sales heads of all operating companies timely information of interest, both technical and personal, and condensed reports of subjects discussed at the "Home Service Workshop" conference.

The Committee ambitiously tackled an assignment of developing plans for "home service reconversion" from war work. The Chairman analyzed and challenged most of the pre-war home service policies and practices, plus many new ones, in the form of a comprehensive exploratory outline. About 20 basic questions were raised, covering the fields of home calls, cooking schools, cooperation with salesmen at point of sale, demonstrations before groups of employees, dealers, women and school children, and general and special services to the public through radio, newspaper, and other means. In addition, some 70 or 80 secondary questions were raised which particularize certain phases of the basic questions or treat with methods of effectuating suggested plans.

This outline was distributed to home service heads in the operating companies with a request that answers reflect their own views and plans. Results have been summarized and distributed among the companies, enabling each to benefit by comparison with plans of others; a sort of clearing house of policy-making views and intended methods of operation.

Realizing the importance of training new employees, particularly in view of probable expansion in the number of home service personnel post-war and the highly specialized nature of their work, the Committee began development of a home service training course. Assignments of portions of the course were made to individual companies. Ultimately these can be composed into a complete training manual, covering those elements more or less common to the operation of all home service departments. While it has not been possible to complete this work during the year, sufficient progress has been made to warrant the recommendation that the incoming Home Service Committee undertake its completion. I am certain Miss Bates can be counted on to assist in this respect.

The committee chairman has prepared a report which covers the year's work fully, and which makes three recommendations:

1. That the training course development be carried forward next year.

2. That next year's committee give further consideration to establishing a Home Service Scholarship Plan, to interest colleges in slanting their home economics courses in a more commercial vein.

3. That next year's committee give further consideration to the possibility of developing a home service motion picture for showing to groups of women.

Commercial and Industrial Sales

A. O. Leech has served as Sponsor of the Commercial and Industrial Sales Activity.

Early in the year a Commercial Cooking Equipment Council was formed, composed of representatives of both manufacturers and gas companies, for the purpose of joint consideration of matters of mutual interest. At a meeting of the Council in January, there was lively follow-up of the work of the post-war appliance committee of the preceding two years. Appropriate ventilation of commercial kitchens, new departures in ventilating hood designs, numerous improvements in heavy duty cooking equipment, and better methods of equipment servicing were considered particularly important. One member utility company has agreed to undertake laboratory development and test work on new types of ventilating hoods, but has been unable to make progress because of manpower shortages. These and other subjects considered at the Council meeting are outlined in detail in Mr. Leech's report.

From contacts and communications with industrial-commercial sales heads of member companies, Mr. Leech has developed a list of subjects which he recommends be given further consideration by the incoming Commercial-Industrial Sales Committee. These fall into the two categories of "Subjects Involving Unsolved Problems" and "Subjects Involving Need for Greater Distribution of Information"; they are included in Mr. Leech's report. Certain of these call for consideration at future meetings of the Commercial Cooking Equipment Council, which it is recommended be continued because of its success and the high interest of its members.

In the commercial-industrial sales activities it has become apparent that close liaison between our Association's activities and those of related committees of American Gas Association is increasingly important. As a means of furthering this coordination, Mr. Leech's report includes a recommendation that the Sponsor or Chairman of our Association's Commercial and Industrial Sales Activity should continue to be a member of the Managing Committee of the Industrial and Commercial Gas Section of A.G.A.; and that the Chairman of our Commercial Cooking Equipment Council could to advantage be a member of the Food Service Equipment Committee of the A.G.A., Industrial and Commercial Gas Section.

Domestic Sales

R. L. Hayden has served as Sponsor of the Domestic Sales Activity.

At the outset of the year it appeared that under existing con-

ditions a departure from the practice of appointing a general committee would be advisable. Instead, certain special committees were appointed to handle special projects; and several Joint Councils,* composed of manufacturer and utility representatives, were formed as a means of treating with general matters of mutual interest and to promote the already advanced degree of manufacturer-utility cooperation.

Several meetings of each Council were held, and records of the deliberations and conclusions have been mailed to those in attendance and all who were designated originally to represent each manufacturer and utility company. Thus it is believed all elements of our Association have been afforded opportunities to participate in sales policy-making and other matters of interest, and have been kept abreast of developments.

The Councils have provided opportunities for review of proposed A.G.A. promotional programs, and for collectively voicing to appropriate A.G.A. committees, prior to completion of their plans, our evaluation of the applicability of such plans to the Pacific Coast territory. Notable among such matters have been the contemplated "CP" or Certified Performance programs for heating and for water heating, which, as proposed, were found unsuited to Pacific Coast conditions.

Mr. Hayden's report very ably and thoroughly covers the work of the Councils and the Special Committee on Sales Training. Of noteworthy significance in this material are:

(1) The standards for better heating, developed by subcommittees of the Heating Council in connection with consideration of the proposed A.G.A.-"CP" heating plan, and recommended by that Council for Association use;

(2) The recognition of needs for new methods of selling ranges and refrigerators to mass housing projects to meet competition adequately;

(3) The water heater sizing chart developed by a subcommittee of the Water Heater Council and adopted by that Council;

(4) The four promotional pamphlets prepared by a subcommittee of the Water Heater Council, and being published by that Council, dealing with proper sizing, use of hot water in the home, proper methods of water heater display, and proper methods for location and installation of water heaters; and

(5) The leader's manual being developed by the Special Committee on Sales Training to implement the Association's existing sales training course and supplement the material being developed by A.G.A.

Other subjects discussed at the Councils include appliance servicing problems; the coordinated or "New Freedom Gas Kitchen" and plans for its promotion, sale and installation; the forthcoming A.G.A. architect-builder data book; needed appliance improvements; and special selling problems and policies.

In addition, a special committee has recently been appointed by Mr. Hayden to study the post-war appliance dealer situation. Composed of the Chairmen of the Councils, the Chairmen of the Products Divisions of the Manufacturers Section, and market analyst specialists, this Committee is undertaking study of the adequacy of gas industry representation at the retail dealer level in light of competitive positions, keeping in mind the risks of overexpansion of dealer outlets under later and more normal conditions. The Committee has only commenced its work, and no findings have been possible during this Association year. It is recommended, however, that this project be carried to conclusion.

OTHER ACTIVITIES

1. Coordination with American Gas Association

It has appeared that much information concerning A.G.A. committee activities was generally available to P.C.G.A. member companies only where they had individual representatives serving as members of such committees; and that a more widespread distribution of such information among our member companies would improve coordination, eliminate duplication, and promote better planning.

A.G.A. Headquarters Staff was approached, and agreed to make available copies of minutes of meetings of appropriate committees of the Residential Gas and the Industrial and Commercial Gas Sections. These in turn have been distributed to members of the Executive Committee of our P.C.G.A. Sales and Advertising Section. In exchange, copies of minutes of our Council meetings have been forwarded to chairmen of appropriate A.G.A. committees and to A.G.A. Headquarters. Reaction of our member companies has been favorable, and it is recommended that this arrangement, or some equivalent counterpart, be continued.

It is the Chairman's sincere conviction that close cooperation with A.G.A., including a full and frank interchange of information and views, should be one of our primary objectives.

2. Motion Picture

The Special Committee on Sales Training appointed at the beginning of the year originally planned to develop visual aid material, including a motion picture dealing with the gas industry, for indoctrination courses for dealer and utility employees. Further study made in conjunction with the Chairman of the Cooperative Advertising Committee showed that the cost of such a picture could not be justified for training purposes alone, and it was jointly recommended that the picture be approved as a special project, designed primarily for promotional use in public showing, but for secondary use for sales training and indoctrination purposes. After obtaining approval of the Association's directors to appropriate $10,000 for this purpose, President Doerr appointed a special committee, which included the chairmen of the Sales and Advertising Section and of the Cooperative Advertising Committee, to develop and produce such a picture. It is now in production, and it is expected finished copies will be available for sale to member companies soon.

The Chairmen reported to President Doerr the industry's critical need for several additional motion pictures dealing with individual subjects of promotional nature, recommending that the matter be brought before A.G.A. because of the need to spread high production costs of such pictures on a national rather than regional basis. President Doerr forwarded to A.G.A. a comprehensive exposition of this need, with recommendations that provision for a complete program of motion picture production be included in the new A.G.A. promotional fund. This was referred to the new A.G.A. Promotional Committee. It is recommended that a reminder of this important need and request for early consideration of it be sent to the Promotional Committee by our Association's President at an early date.

3. Follow-Up of Post-War Appliance Recommendations of Committee on Gas Industry Development

Following distribution of our Association's recommendations for improving post-war gas appliances to manufacturers last year, continuing requests for additional copies and for copies of other related special reports previously issued, have been received. Many have come from manufacturers in the East. All such requests have been cared for, and it is obviously desirable that this continue to be done. Further, it is considered important that these appliance improvement recommendations be kept actively before our manufacturers, through group discussions at Council meetings and by all other possible means.

In addition, copies of these appliance recommendations were recently made available to the Chairman of the General Approval Requirements Committee for the A.G.A. Testing Laboratories, and, at his suggestion, to the Chairmen of the several Approval Requirements Subcommittees for the various types of appliances. It is possible that some of our Pacific Coast recommendations may reflect themselves in improved appliance approval requirements adopted by these committees in the future.

4. A.G.A. Technical Conference on Domestic Gas Research

The Sales and Advertising Section, together with the Manufacturers Section, sponsored jointly with the A.G.A. Domestic

*Gas Range & Refrigerator Council, Gas Heating Council, and Gas Water Heating Council.

Research Committee the latter's second annual Pacific Coast Technical Conference on Domestic Gas Research. It was the Chairman's pleasure to be able to cooperate in the development and presentation of this program.

ACKNOWLEDGMENTS

That this has been a trying year to all in our industry is well known. That, in the face of this condition, the members of our various committees and councils have given much of their time and effort may not be so well known. To them, and particularly to the various Chairmen, I wish to express and record my sincere appreciation.

It has been a pleasure to work with President Doerr, and to have had the unfailing assistance of our Managing Director, Clifford Johnstone.

Report on Home Service

By MERCEDES BATES, *Sponsor*

Southern California Gas Company

THE HOME SERVICE program of the Sales and Advertising Section of the Pacific Coast Gas Association was determined at a meeting held during the September convention, 1944.

OBJECTIVES

News Letter:

Since the News Letter represents one of our most valuable channels of communication, it was decided to continue them on a quarterly basis, or as frequently as the chairman deemed necessary. The News Letter would be compiled and distributed from the office of the chairman.

Spring Work Shop:

In accordance with Pacific Coast Gas Association's policy of holding work meetings during the year, a spring Home Service Work Shop was planned which would be held jointly under the Home Service Committees of American Gas Association and Pacific Coast Gas Association. The dates and details were to be developed later in the year.

Post War Planning:

With the rest of the industry, home service was planning for a post war period. Home service activities had changed greatly because of the war and the decision as to the number of former activities to be resumed and the number of current activities to be retained was a vital one to each department. While understanding that such plans would be only tentative and subject to change because of unforeseen factors in the post war period, the Committee felt that each member would be assisted by a compilation of the plans of member companies, so that a comparison might be made before definite policies were adopted. This project was to be carried out by the distribution of an outline in question form to be answered by each company.

Home Service Training:

The Committee expected that almost every company would have need for a definite training program in the near future. Most departments expect to expand and all expect many personnel adjustments. In order to maintain adequate Home Service operations during this adjustment period, definite plans for training must be made. Since most Pacific coast companies operate in very nearly the same fashion, it was thought feasible to make such training plans on an Association basis, thereby relieving each department of some of the responsibility. The plans for this training course were to be developed later through Committee action.

ACCOMPLISHMENTS

The Home Service Committee has accomplished most of its aims for the year's work.

News Letter:

Three News Letters have been distributed to home service and executive members of the Pacific Coast Gas Association. The first News Letter was distributed in December, 1944, announcing the plans for the Home Service Work Shop in the spring, and providing information on personnel changes and current home service programs.

The second News Letter was distributed in March, 1945, as a record of the spring Work Shop meeting of February 28 and March 1.

The third News Letter was distributed in September, 1945, as an interchange of ideas which would substitute for the usual Committee meeting cancelled with the annual convention.

Spring Work Shop:

The Work Shop meeting was held February 28 and March 1, 1945, in the auditorium of the Southern California Gas Company in Los Angeles. Jointly sponsored by the Home Service Committees of the American Gas Association and the Pacific Coast Gas Association, the meeting was the only one of the series planned by the American Gas Association which was held.

The meeting was attended by 32 home service representatives from all but one member company maintaining a Home Service department. Miss Colleen Fowler, Home Service Chairman for the American Gas Association, was also present. The program was designed to cover those subjects of greatest interest to home service people.

Home Service Post War Planning:

In December, 1944, a question outline of Home Service activities was sent to all member companies of the Association. The outline was divided into major activities such as home calls, cooking schools, dealer cooperation, and school activities. Sub-headings under each section determined each company's evaluation of that activity and the method to be used in carrying it out. Originally it had been planned to discuss the returns from this questionnaire at the Spring Work Shop meeting. However, the program was too crowded to permit this discussion. All replies were not received until June, 1945. The material was then compiled so that a comparison of the tentative plans of each company could be made. The result was distributed in August, 1945. The project was one which had consumed a considerable amount of Committee time, and it is hoped that the results will be of value, even though the planning is necessarily limited by economic developments and other factors.

Home Service Training Course:

A pattern for sales training which was developed by R. C. Terradell, Southern California Gas Company, for presentation at the Work Shop, was used as a basis for the individual assignments. A representative from each company was assigned a portion of the material and asked to return the completed assignment to the Chairman by July 1 in order that the material might be compiled and circulated to all Committee members for criticism and changes before the final training course was printed. However, the press of work has been such that it has been impossible to complete the preliminary assignments within the time allowed, and the project remains unfinished.

RECOMMENDATIONS

Home Service Training Course:

The need for home service training material is as urgent now as it was a year ago. As we approach the end of the war period, each department faces certain personnel changes and needs more than ever a means for rapid and complete training of new personnel. This project I believe to be one of our most important, although one of our more time-consuming. I recommend, therefore, that this project be continued into the next Committee year, and completed under the guidance of the next Home Service Chairman.

Home Service Film:

Each department has struggled with the problem of obtaining adequately trained personnel. Although the war has intensified this problem, its origins are rooted in the lack of adaptability of the college program rather than in the manpower shortage. Miss Rita Calhoun, home service director of Portland Gas and Coke Company, indicated during the spring Work Shop meeting that Oregon State College had again become interested in training home economics students for business. Since the utilities represent one of the largest fields of employment in business for home economics trained women on the Pacific coast, it would seem logical that the Association, through its Home Service committee, might foster this training in our west coast schools of home economics.

One way of accomplishing this might be an Association-sponsored scholarship of $500.00 awarded annually to a junior student in home economics for use during her senior year. Standards for selection should be based not on scholarship alone, but on appearance, personality and extra curricular activities as well. Through the Association, the student winning the scholarship would be offered a home service position in one of the west coast utilities after graduation. Selection of the student would be made by a committee composed of college representatives, but would have Home Service committee representation as well.

A scholarship of this type should attract a more desirable type of student to business home economics and should enhance the standards of business home economics in the eyes of the universities. The personnel which we would gain through the awarding of the scholarship would be incidental to the ultimate value to be obtained through better college training of all of our home economics graduates. I recommend that this Home Service scholarship be discussed with the Board of Pacific Coast Gas Association, and that the next Home Service Chairman investigate and develop the project more fully.

Home Service Film:

For some time home service departments of member companies have felt the need for a motion picture film which could be used to supplement their current activities. Such a film, in order to be used by each company, would necessarily be general in the subject material covered. However, the home service activity itself represents one of the greatest services offered by the gas industry to the communities which it serves.

Since all Pacific coast home service departments operate on much the same basis, I believe that the most valuable and impressive subject material which could be developed into a film would be a pictorial representation of this service. A good script writer could develop this material into a fascinating story which should have great appeal for adult audiences. A film of this type could be used for women's club programs. Since it should be short—not more than 20 minutes in length—it could supplement theater cooking school programs. Its subject material would also make it a valuable aid to vocational guidance in high schools and colleges.

Whatever the selected subject might be, I believe that there is no question of the need for a film to supplement our present activities. I recommend that the possibility of the home service motion picture be considered and pursued by the next Home Service Chairman and her Committee.

Report on Commercial and Industrial Sales

By A. O. LEECH, *Sponsor*

Portland Gas and Coke Company

THE ACTIVITY of the group got off to a good start with a meeting of the Commercial Cooking Equipment Council in Los Angeles, on January 18, 1945. The meeting was well attended by representatives of manufacturers and utilities.

The meeting of the council was opened by R. D. MacMahon, who had prepared a most interesting agenda. A. O. Leech greeted those present and expressed his appreciation for the interest shown by the attendance. W. M. Jacobs explained the formation and objectives of the joint councils. These informal gatherings and discussions tend to lead to better and closer relationship between sales and technical personnel of the appliance and equipment manufacturers and the gas utilities.

The first subject on the agenda was a review of "Recommendations for Post War Gas Appliances" as prepared by the joint council during the previous year. Each section of the "recommendations" was presented by a member of last year's committee who had worked on the particular section. There were a number of lively discussions covering the subjects of range vents, pilot filters, more rugged thermostats, the need of indicating valves, and better oven linings. Prominent in the discussions were Louis Singleton, Guy Kendall, L. Wollenberger, C. A. Renz, F. M. Foster, J. H. Gum, and N. H. King.

Harry Warren outlined in considerable detail the program of investigation with respect to hood ventilation which was being started at the laboratory sponsored by Southern California Gas Company and Southern Counties Gas Company. It is the intention to conduct tests on all types of kitchen appliance groupings as well as on all various types of hood ventilators.

Clyde H. Potter presented a review of the publicity and advertising program of the cooperative advertising committee of the Pacific Coast Gas Association. He illustrated his report with samples of Commercial and Industrial advertising used. During the discussion which followed a number of suggestions were made to Mr. Potter for inclusion in the future program, including more attention to deep fat fryers, food warmers, and griddles.

Forrest Naylor led an interesting discussion on the policies and practices of the various companies as regards servicing commercial cooking equipment. As liaison representative between the various councils, Mr. Naylor was able to bring to the meeting the thinking and suggestions of the servicemen and other utilization personnel.

During the meeting of the council, ideas were developed for further activity during the year. Plans as formulated included holding more meetings of the council, development of closer cooperation with committees of the American Gas Association, sponsoring of discussion of commercial cooking subjects at utilization council meetings, and preparation of some individual papers. Unfortunately, many of the projects became war casualties due to the pressure of emergency work and the restrictions on travelling.

Cooperation with the American Gas Association:

A full report of the council meeting was forwarded to the Chairman of the Food Service Equipment Committee of the Industrial and Commercial Gas Section of the American Gas Association. This report was used in a joint meeting held at Toledo, Ohio, between the A.G.A. Food Service Equipment Committee and a committee representing the manufacturers of commercial cooking equipment. Minutes of the meeting held in Toledo state: "The Secretary read a letter from A. O. Leech, member of this committee and Chairman of the Commercial and Industrial Sales Group of the Pacific Coast Gas Association, expressing the viewpoints of men on the Pacific Coast which indicated an earnest desire to know what progress is being made or is being planned by manufacturers to incorporate many of the suggested improvements made in the report of the Appliance Study Sub-Committee last year in the construction of post-war appliances."

D. E. Farmer, sponsor of Utilization Technical Section, was asked to discuss two subjects at a utilization conference held in San Francisco during the summer. The subjects were: (1) servicing and maintenance of commercial cooking appliances; and (2) shortcomings and difficulties with water heaters in restaurant applications. The discussions held at that council meeting and some of the ideas brought forth will make very interesting material for presentation at the next meeting of the sales and manufacturers' joint council meeting and will no doubt lead to some improvements in equipment and some improvements in sales practice.

Out of the various activities there has developed a list of subjects that provide opportunity for further worthwhile activity. All of these subjects are not of interest to everyone in the commercial and industrial section of the industry but each of them is of considerable interest to a sufficient number of people to warrant association activity. These subjects fall into two types—first, those involving unsolved problems, and second, those where information probably exists but needs further or greater distribution. I recommend that the following subjects receive attention in next year's program.

A. Subjects Involving Unsolved Problems

1. Improvements in Commercial Cooking Appliances.
   A progress report from A.G.A.E.M. is needed.
   A.G.A. committee should be supported.
2. Servicing and Maintenance of Commercial Cooking Appliances.
   Should be discussed further at Utilization & Sales Councils.
3. Improvements in Kitchen Ventilation.
   Experiments being conducted at Los Angeles.
4. Water Heating in Restaurants.
   Should be discussed at both, Utilization and Commercial Cooking.
   Councils—Warrants a sub-committee from Council.
5. Utilities Part in Kitchen Planning.
   Should be discussed at Cooking Council.
6. Dealer Cooperation in a Competitive Area.
   Should be discussed at Cooking Council Meeting.

B. Subjects Needing Greater Distribution of Information.

7. Industrial Processes.
   A review of new processes in layman's language needed.
   Re-activate Industrial Data sheets or design a program for information exchange.
8. Do Gas Turbines Offer Gas Companies an Opportunity?
   A statement in layman's language needed.
9. The position of LP-Gas in the Commercial Cooking Field.
   Report from the LP-Gas Industry needed.
10. Air Conditioning.
    Valuable data being recorded at Los Angeles.

Interest in the commercial cooking equipment council meetings is very great and continuation of that program of holding small group meetings is first among my recommendations for the coming year. As a means of maintaining good coordination with the activities of the American Gas Association, I recommend that the sponsor of the Commercial and Industrial Committee of the Sales Section of the Pacific Coast Gas Association continue to be a member of the managing committee of the Industrial Section of the A.G.A. and that the chairman of the council on commercial cooking equipment of the Pacific Coast Gas Association be a member of the Food Service Equipment Committee of the A.G.A.

In closing this report, I take this means to express my great appreciation to W. M. Jacobs, chairman of the Sales and Advertising Section, and Clifford Johnstone for the valuable guidance they have furnished during the year. I also want to especially thank R. D. MacMahon for the great amount of time and effort he contributed to the joint council meetings.

Report on Domestic Sales

By R. L. HAYDEN, *Sponsor*

Coast Counties Gas and Electric Company

AT THE beginning of our 1944-45 committee year it was generally felt that the final year of war was at hand and that not too long a time remained for planning the many phases of reconversion to selling that presented themselves as important to the postwar success of the gas industry. Accordingly, under the theme "Reconversion to Sales" the committee fashioned itself to embrace the task by recognizing as fundamental just two objectives which, if pursued and successfully accomplished in the reconversion period following the war, would assure our industry at least a front line starting point in the coming race for the domestic market.

Broadly these objectives are (1) improvement of gas appliances and (2) adequate sales training. These points had been brought out very strongly in the report of the Committee for Gas Industry Development presented at the 1944 annual meeting of the Association by Mr. H. L. Masser, its Chairman. In addition many specific recommendations were made in the report for building the prestige and business of the gas industry in the postwar period and it was felt that beyond its work toward appliance improvement and sales training, the Domestic Sales Committee should also serve to carry these recommendations forward into positive action.

To accomplish this and to provide ways and means for solving other problems of mutual interest to manufacturers and utilities, the Board of Directors of the Association, acting with the approval of the Manufacturers' Section, authorized the organization of a number of Councils, each one dealing with a specific appliance or group of appliances and each one assigned the job of studying and attempting to solve all problems concerning its appliance which are of mutual interest. The three Councils that were organized under the sponsorship of this committee and the present leaders of each are:

Gas Heating Council:
Chairman: J. S. C. Ross, Pacific Gas & Electric Company.
Vice Chairman: J. G. Merkle, Southern California Gas Co.
Co-Chairman: C. A. Gabriel, Monarch Heating Company.

Gas Range and Refrigerator Council:
Chairman: J. G. Merkle, Southern California Gas Company.
Vice Chairman: Wayne Clark, Pacific Gas & Electric Co.
Co-Chairman: H. F. Larkin, O'Keefe & Merritt Company.

Gas Water Heater Council:
Chairman: C. H. Potter, Southern Counties Gas Company.
Co-Chairman: Claude Ballinger, Republic Heater Corp.

The manufacturers' interest and participation in the Councils is indicated by the fact that 29 are members of the Heating Council, 15 are members of the Range and Refrigerator Council, and 20 are working with the Water Heater Council. Seven utilities are members of each of the Councils. This joint consideration of mutual problems by manufacturers and utilities through harmonious and uninhibited participation of their representatives has brought about an atmosphere of understanding and cooperation much more suitable to the furtherance of an industry program than heretofore was attainable through separate and individual approaches.

Through the meetings of the Councils together with Council sub-committee work done on special assignments by its members, a great deal to justify a continuation of effort has been accomplished. A brief outline of the ground covered thus far by each of the Councils in the Domestic Sales Group will be of interest:

Gas Heating Council

This Council held two meetings, the first on January 17, 1945, and the second on July 25, with a total attendance of 117 representing 5 utilities and 23 manufacturers. Objectives of this group were the study and exploration of the following:

1. Certified Performance Heating: The feasibility of participation by Pacific Coast manufacturers and utilities in a national A.G.A. and A.G.A.E.M. sponsored certified heating program.

2. Postwar Appliances: Review of the recommendations for heating appliances as developed by the Committee for Gas Industry Development and distributed by the Association in booklet form.

3. Sales Policies: Review of postwar sales policies as generalized in the report of the Committee for Gas Industry Development and distributed by the Association in booklet form.

As the matter of Certified Performance Heating was of considerable importance and involved much of a controversial nature, almost all of the time spent by the Council was in its disposition. At the first Council meeting the national "CP" Heating program was introduced by W. M. Jacobs, Chairman of the Sales and Advertising Section, P.C.G.A., who reviewed the development of the program from its original proposal by the A.G.A. House Heating and Winter Air Conditioning Committee in 1942. Under this plan the manufacturers of equipment built to approved "CP" standards and specifications would affix a "CP" seal to such equipment, while the utilities would be required to issue a "CP" seal on each approved *installation.* To finance a national promotional and advertising program, the manufacturer and utility were to pay certain fees for each "CP" seal thus placed.

Discussion in the Council brought forth many points of difference with the national program, principally the matter of installation requirements, the manner of policing these requirements, and the terminology of "Certified Performance" as applied to comfort heating. It was also generally felt that gas heating has achieved such wide acceptance in most areas of the Pacific Coast that our utilities and manufacturers are more interested in the "CP" program as a tool in upgrading the quality of heating installations than in its promotional features. The utility members of the Council were largely hesitant to commit themselves to the potentially tremendous physical job of inspection and to accept the legal responsibility implied in certifying to "satisfactory performance" when so great a part is played by the human element.

A sub-committee of the Council made a study of the proposed "CP" requirements and was able to agree on recommendations for changes which would be acceptable to manufacturers and utilities in the Pacific Coast area. These, together with certain suggested means of licensing and bonding "CP" heating contractors, utilities, or any other responsible group, which would eliminate the policing and inspection objections, have been transmitted to the A.G.A. Home Heating Committee.

At the Council meeting held on July 25, 1945, called mainly to act upon a reconsideration request by the A.G.A. Committee, it was resolved that the Gas Heating Council of the P.C.G.A. had concluded that it was unable to endorse and support the "CP" heating plan as now written, enumerating some of the objections stated above but at the same time pointing to a possible means of modification which might provide a basis for reviving Pacific Coast interest.

At this meeting the Council voted to explore the possibility of the development of a set standard for the installation of gas heating appliances which would be acceptable to all Pacific Coast interests.

The recommendations of the Committee for Gas Industry Development as they pertain to heating appliances were reviewed in the Council's meeting of January 17 with the suggestion that each manufacturer follow through on those improvements applicable to his production.

Gas Range and Refrigerator Council

This Council held one full day meeting on February 20, 1945, with 59 individuals representing 15 manufacturers and 5 utilities in attendance. The objectives of this Council as covered by its agenda for this meeting were:

1. Review of the recommendations for Domestic Gas Ranges and Gas Refrigerators as developed by the Committee for Gas Industry Development and distributed by the Association in booklet form.

2. Coordinated All-Gas Kitchen Program.

3. Sale of appliances for installation in large multiple dwelling units.

The Council recognizes that the improvements in the Domestic Gas Range will closely follow the development of the "CP" range program and for that reason discussed at length the current activities of the Domestic Gas Range Committee of the American Gas Association.

It is also recognized that "package" kitchen planning and promotion provides a means for stimulating the sale of gas and gas appliances. The industry will find need to emphasize this type of promotion because of public interest in homes and kitchens and because of activities of competitors along similar lines, but several problems must be considered—for instance—

1. Who will handle local promotion?

2. What procedure is to be adopted to provide for complete package kitchen sales and installation?

3. Inasmuch as it is not practicable for all appliance dealers to handle unit sales, what plan should be developed to take care of complete installations?

4. In kitchen remodeling in existing homes who will coordinate the various trades involved? Carpenter, plumber, electrician, painter, linoleum layer, etc.?

It is apparent that some simple method must be developed to permit *easy* customer purchases of complete kitchen installations. Both utilities and manufacturers may have to cooperate in establishing some plan, possibly developing a few large dealers in the metropolitan areas who will be sufficiently specialized and staffed to display, sell, and provide complete installations of "package" kitchens.

The Council explored the question of the sale of appliances in multiple dwelling units in anticipation of a large volume of mass building following the war. It seems a certainty that the postwar builder will develop the mass building of individual low-priced detached homes complete with all appliances. It is anticipated that certain electric appliance manufacturers will offer their complete "package" units directly to builders at wholesale prices, thus "by-passing" their regular dealer outlets. It is therefore imperative that the gas industry develop some type of counter-proposal presenting a complete unit package including all appliances, and at a low enough price to allow dealer outlets to profitably merchandise it. In some instances involving the largest builders, the direct sale from manufacturer or distributor might be warranted with some consideration in the form of a commission given to the dealer, who but for the matter of price, might have made the sale.

Other questions which naturally follow are:

1. How will warranty and service obligations be handled on large volume sales?

2. What gas utility assistance is needed by manufacturers who elect to sell directly to such building contractors?

3. Should gas utility salesmen, contacting such builders, quote prices on direct wholesale sales made by manufactures?

Gas Water Heater Council

The Water Heater Council has held two meetings, the first on February 21, 1945, and the second on July 25. An attendance totaling 126 representing 22 manufacturers and six utilities was recorded. The principal objective of this group was the consideration of the following questions relating to its subject:

1. Certified Performance Water Heating.

2. Postwar Water Heaters.

3. Sales Policies.

As considerable attention was being given to the development of a "CP" Water Heater program by eastern manufacturers and by the A.G.A. Committee on Water Heating, this Council made the subject one of the first to be discussed. It was felt that such a plan as recommended was of great interest to Pacific Coast water heater manufacturers as approximately 40% of the automatic water heater production in the country is produced by them and that the opinions and recommendations of this group should have an important bearing on any action taken nationally by the industry. The thinking of this Council, after broad and lengthy discussion, may be outlined much as indicated in the following excerpt from the minutes of its February 21 meeting:

"The following motion was carried unanimously: This group, composed of water heater manufacturers and utility men, favors a program to upgrade water heaters. The group realizes that certain problems must be solved before a final and favorable declaration with respect to a certified performance plan can be made. Provisions affecting such a declaration should be suggested by this group to the A.G.A. Committee as soon as possible."

The discussion of postwar water heaters was largely guided by the published report of the Committee for Gas Industry Development. Improved appearance, improvement of safety pilots and controls, and an adequate sizing program were recognized as essential by the Council. A special committee on Water Heater Sizing was formed under the Chairmanship of Claude Ballinger, Republic Heater Corporation, and Co-chairman of the Council. After studying the subject from all sides and after gathering pertinent data from many sources, this committee submitted its report at the Council meeting of July 25. This report was accepted unanimously by all members of the Council present and because it represents a real achievement in the industry, the report is given here in full:

"The assignment given this committee was that of preparing a sizing chart which would assure completely satisfactory gas hot water service to domestic consumers.

"Among the factors considered by the committee are the following:

1. The generally recognized fact that hot water service in most homes in the past has been inadequate.
2. The probable increase in the use of hot water because of a new and greater knowledge concerning sanitation and proper temperatures of hot water for various tasks.
3. The new uses for hot water which will be occasioned by the wider use of automatic laundry machines and dishwashers in the postwar era.

"The accompanying chart is based on the initial premise that no heater of less than 30-gal. storage capacity should be specified for domestic installations. The fact that most 20-gal. sizes, or smaller, water heaters have not supplied adequate hot water, and that the life of an adequately sized water heater with normal usage is much greater than that of an undersized heater which is constantly overworked, justifies this recommendation.

"The sizes recommended are based on number of bathrooms and bedrooms, as indicating 'potential' tenancy, rather than on the number of persons who may be occupying the house at any given date. The committee feels that only on this basis can adequate hot water service be assured for guests, changes of tenants, and emergencies.

"The committee feels that any chart, to be of value, must be acceptable to utility companies, manufacturers and dealers alike, and must be in such simple form as to be easily applied by sales people and readily understood by prospective purchasers. To that end the committee has purposely avoided any requirements for complicated calculations in the use of the chart, and believes that the form of the accompanying chart and the sizing recommended will fully meet these conditions.

"The committee feels that by closely following the sizing recommendations as shown on the chart the consumer will be assured of adequate hot water service under average conditions, and that in most instances the water heaters will have longer life, thus creating satisfied customers for both manufacturers, dealers and utility companies.

"If the sizing chart is to accomplish its maximum purpose, it should bear evidence within itself that it does represent the minimum recommendations of the gas and allied industries, and its use must be advertised and promoted by all interested parties. To that end the committee recommends:

(a) That the charts used in the several territories be endorsed by the serving utility company, local and State plumber and dealer organizations, and if possible by F.H.A. and architect and builder groups.

(b) That an attractive wall chart, possibly 26 by 40 in., and bearing these endorsements, be prepared and given dealers for posting in prominent places in their water heater show rooms.

(c) That small pocket charts be prepared for plumbers and salesmen working in the field, for their and their customers' ready reference to industry recommendations.

(d) That the desirability of following chart recommendations be referred to in utility company, manufacturer and Pacific Coast Gas Association advertising.

"The adoption and proper application of a sizing chart of this nature will mean that utility, manufacturer and dealer personnel must be trained in its use, and the committee feels that this is a matter which can be adequately taken care of if the manufacturers and the several utility companies undertake it seriously and persistently."

RECOMMENDED SIZING CHART

Number of Bathrooms	*Number of Bedrooms*	*Storage Capacity in Gallons*
1	1 or 2	30
1	3 or 4	40
2	2 or 3	40
2	4 or 5	50
3	3	50
3 or 4	4 or 5	75

The sales promotion phase of the Council's work was assigned to a committee headed by R. V. Davis, A. O. Smith Corporation, as Chairman. This committee, in its report to the meeting of the Council on July 25, stressed the need for the water heater industry to:

1. Generate a greater public appreciation of the service provided by the automatic gas water heater.
2. Encourage architects, builders, and home owners to provide suitable locations for the installation of water heaters.
3. Prepare information which will assist dealers to influence their customers to buy automatic water heaters of the proper size to provide enough hot water for the home.

To aid in the accomplishment of these objectives, the preparation of four pamphlets was authorized, these pamphlets to cover:

1. Proper sizing of the automatic gas storage water heater.
2. The use of hot water in the home.
3. Suggestions for proper display of automatic gas storage water heaters.
4. Specifications for locating and installing automatic gas storage water heaters.

Assignments for preparation of the pamphlets have been made and publication should be made before the year's end.

It is hoped that the new sizing recommendations and the accompanying educational program will solve many of the water heater manufacturers' and utilities' pre-war problems.

In recognition of the important part that adequate sales training will play in the postwar market, a Sales Training Committee was organized January 2, 1945, with A. P. Stryker, Pacific Gas and Electric Company, as its Chairman, and with J. S. C. Ross, Pacific Gas and Electric Company, J. G. Merkle, Southern California Gas Company, A. R. Combs, Southern Counties Gas Company, and Carrol Miller, Servel Inc., as members. The committee has held several meetings in the pursuit of its objective which is to develop sales training courses applicable to utility and dealer personnel.

The basis for such a training course was naturally provided by the P.C.G.A. Sales Training Program, developed by the California State Department of Education in cooperation with our Association. This course, comprised of 14 units, was published in 1942 just too late to be of real value before selling, as such, fell a victim to war. The material and fundamentals of the course cover the gas appliance selling field so thoroughly that subsequent study has failed to reveal anything of importance that should be added to the subject matter. To bring the course up to today's standards of instruction a visual aid in the form of appropriate sound-slide films should be made available. Instructions to the instructor should also be prepared to cover the more important units of the course.

The production of four product selling sound films was agreed upon, these to augment the P.C.G.A. Sales Training Course and to cover, (1) cooking, (2) water heating, (3) heating, and (4) refrigeration. However, with the announcement of the proposed A.G.A. Sales Training Course indicating the possibility of a duplication of effort, the committee decided to hold in abeyance any action on the films until the films being produced by the A.G.A. could be reviewed. In the meantime, effort was made to have certain selling phases incorporated in the A.G.A. films which might obviate the need for independent production by the P.C.G.A.

Work on instructor's manuals is proceeding and when completed will furnish aid to the instructor on the following units of our Training Course: "Gas Ranges," "Gas Water Heaters," "Gas Heating," "Gas Refrigeration," "The Science and Art of Successful Selling," "The Salesman and the Sale," "Getting Business Outside the Store," and "Preparing to Make an Effective Sales Presentation."

The Sales Training Committee has every hope that the ultimate course to be placed in the hands of utilities, dealers and manufacturers, will equip the industry's sales front so that united, it will present its products in a sound, energetic and convincing manner to the great market that will surely await us.

This year has been one in which group accomplishment has been extremely difficult due to the necessary war-time stringencies in travel. The work completed by our Councils and Committees is most gratifying in view of this and of the many demands placed upon the time of the individual group member by his part in the war effort. The operation of the Joint Councils was considered by all who participated to have been well worth while and there is strong feeling that such groups should continue in a more or less permanent form.

Sales activities in the past 12 months have, in the main, been confined to aiding customers in the procurement of needed appliances and equipment and assisting in maintenance and utilization problems. Utilities have done much through their advertising and publicity to further government food, nutrition and victory garden programs.

Appliances under the rationing program and for necessary replacement were available in moderately increased supply during the year and few cases of need were not taken care of. This fact has done much to further the post-war case of gas as a fuel for in no other type of equipment has there been nearly this performance.

With the war over and gas appliances in ready supply once more we will face a tremendous market which has multiplied the normal by the years of lean supply, by the millions of new families, by the millions of new homes, and by the millions of banked dollars. But as rosy as it seems, we must not lose sight of one most important fact—that after the first flush has passed, competition for priority interest will come from all quarters—new cars, new furnishings, radios, automatic laundries and all the others. Competition, and greater than ever, will come from the electric industry. This means but one thing, our success or failure in the postwar era depends solely on the intelligence and energy we put into our production and marketing programs to the end that no competition will be able to out-perform or out-sell us.

Gas All-Year Air Conditioning Experience in Southern California

By A. F. MICHAEL

Southern California Gas Company

ALL-YEAR air conditioning for health and comfort is being accorded a very prominent place in the nation's plan for post-war living. Recent surveys have shown that a high percentage of people planning after-the-war homes and businesses desire to include air conditioning in their plans and that they can be expected to do so if equipment is made available at a price they can afford. This widespread interest in and recognition of the benefits offered by air conditioning is a culmination of years of pioneering development and promotion and for the first time promises a market of mass proportions.

Manufacturers in this field have visioned the existence of this market and for many years have worked to develop suitable equipment to supply its requirements. Some utility companies likewise have seen in it an opportunity to extend their services and improve their load factor, and have aided in its development and promotion.

As in the case of domestic refrigerators various designs of air conditioning equipment have been developed, some of which operate on electricity and others on gas or similar fuel. To the end that the gas industry won't be found lagging gas utilities should be extensively concerned in the developmnet and promotion of the gas-fired equipment.

Servel, Inc., has been a leader among the manufacturers in this field and in the years just prior to the war had ready for the market on a limited basis, a gas-fired air conditioning unit designed for homes and small business establishments which was the result of research and experimentation extending over a period of years. Development had then reached the stage where field experience in performance and operation of the equipment was required. With the assistance of the sales organizations of interested utilities limited numbers of units were installed for this purpose in representative premises throughout the nation.

The Servel All-Year Gas Air Conditioner combines both heating and cooling in packaged units rated at from 60,000 to 180,000 Btu. on the heating cycle and at 3 or 5 tons refrigeration capacity on the cooling cycle. Heating is produced by a steam coil and cooling is produced by an absorption refrigeration assembly using water under a high vacuum as the refrigerant. Primary energy for both heating and cooling is supplied from a gas heated atmospheric steam generator.

In addition to the new business aspects of the all year conditioner the balancing effect on gas demand curves resulting from the summer cooling load makes it a highly desirable type of business, particularly to those gas companies with a relatively high winter heating load. Recognizing these potentialities the Southern California Gas Company early decided to pioneer acceptance of the Servel units in the area served by the company as a utility. A resume of company experience in this activity may be of interest to others in the utility field.

A program of promotional selling was planned which provided for introductory sales of a number of the units on a special selling price basis. The first unit was sold in March, 1941, and installation was completed in June in the business office of the Palm Springs Water Company at Palm Springs. Between that date and early 1942 when War Production Board orders stopped further sales, 18 installations aggregating 28 units were made in residences and commercial establishments on the company system and three installations totalling six units were installed in company offices. Subsequently, in conformity with War Production Board restrictions, six additional units have been installed from a limited stock on hand, making a present total of 40 units in operation on company lines.

From the standpoint of cooling requirements these installations fall into three general categories best described as (1) heavy commercial, consisting of cafe dining rooms, cocktail bars and drive-in sandwich shops; (2) light commercial, consisting of business offices, doctors' and dentists' clinics and laboratories, and

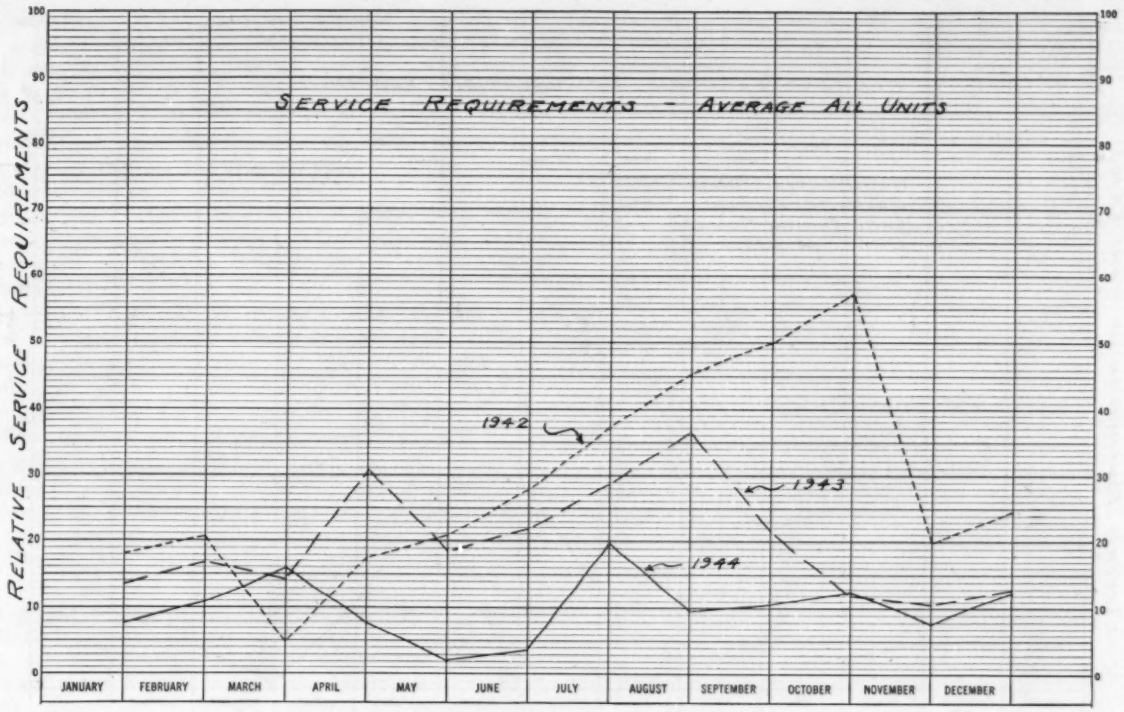


FIG. 1. Service requirements—average all units.

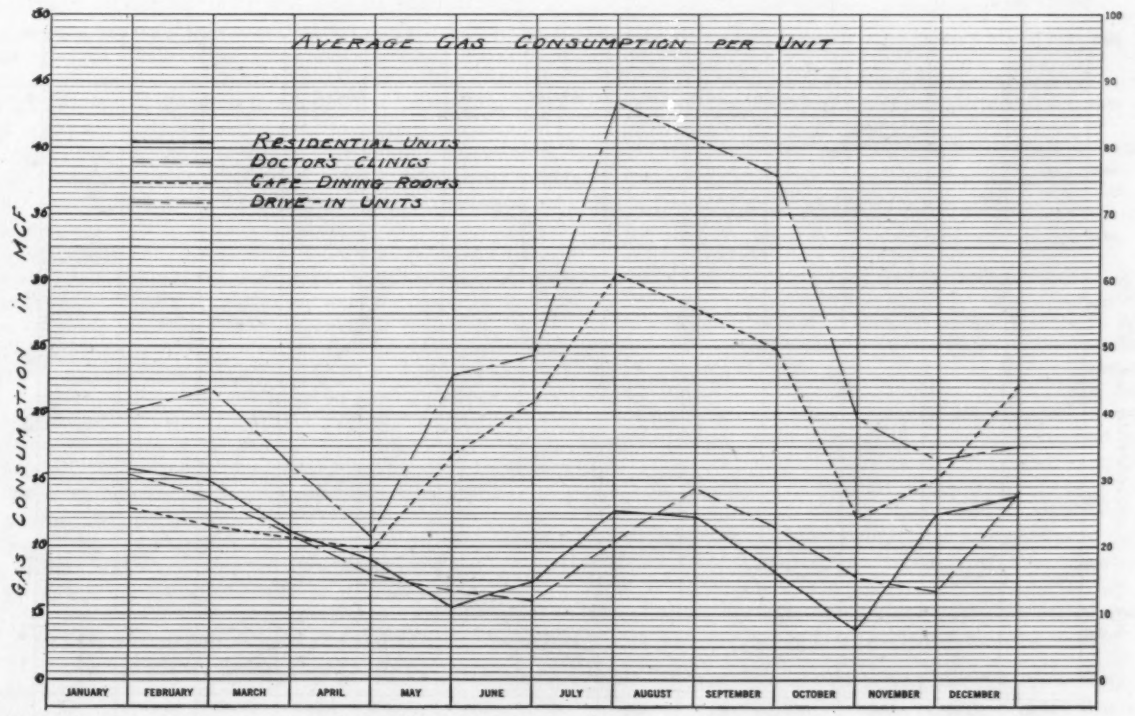


FIG. 2. Average gas consumption per unit.

(3) residences. Seven of the installations mentioned above aggregating 17 units located in or near Los Angeles are in the heavy commercial category. These installations range from single units to banked installations of four units. A typical installation of four units in a combined cafe-bar-drive-in establishment is arranged so that two units condition the main dining room, one unit conditions the cocktail bar and one unit the drive-in section.

Twelve of the installations, totalling 15 units, are in the light commercial category and include three clinics, four business offices, a jewelry store, two laboratory offices, and two laboratories. All of these are single unit installations except three company offices which consist of two units each. They are scattered throughout the warmer areas on the company system.

The remaining eight are single unit residential installations similarly scattered throughout the warmer inland areas.

Field experience with new types of equipment especially when pioneering new fields, invariably discloses "bugs" in performance and operation and in this respect the new gas air condition-

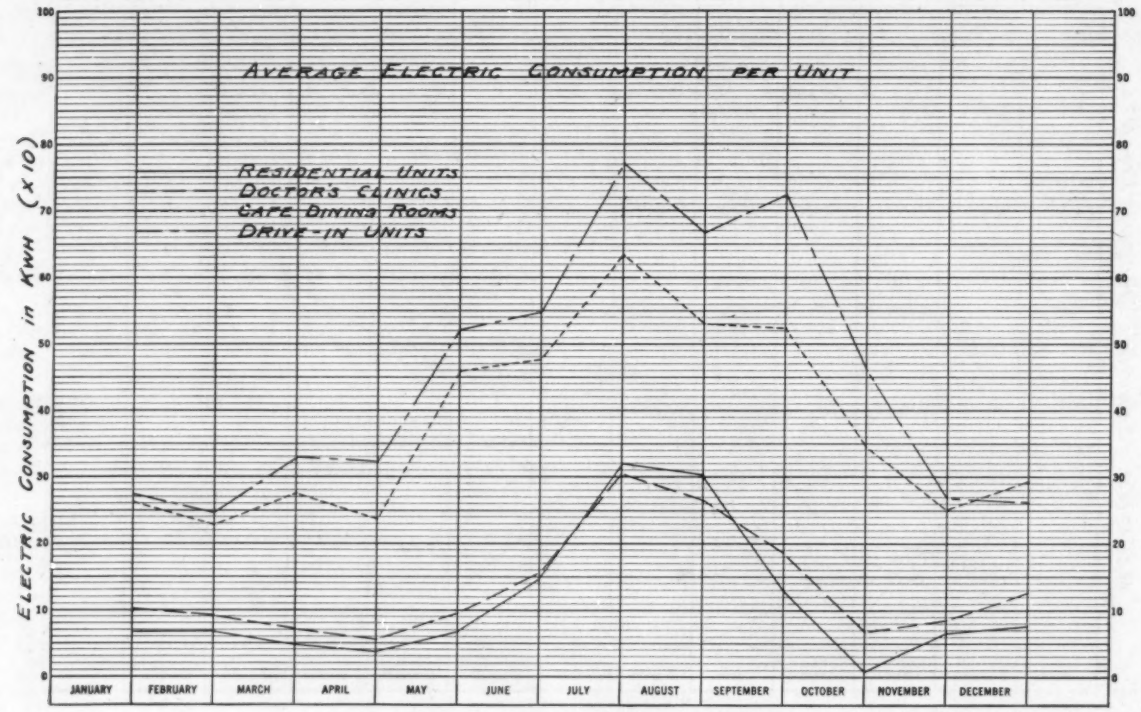


FIG. 3. Average electric consumption per unit.

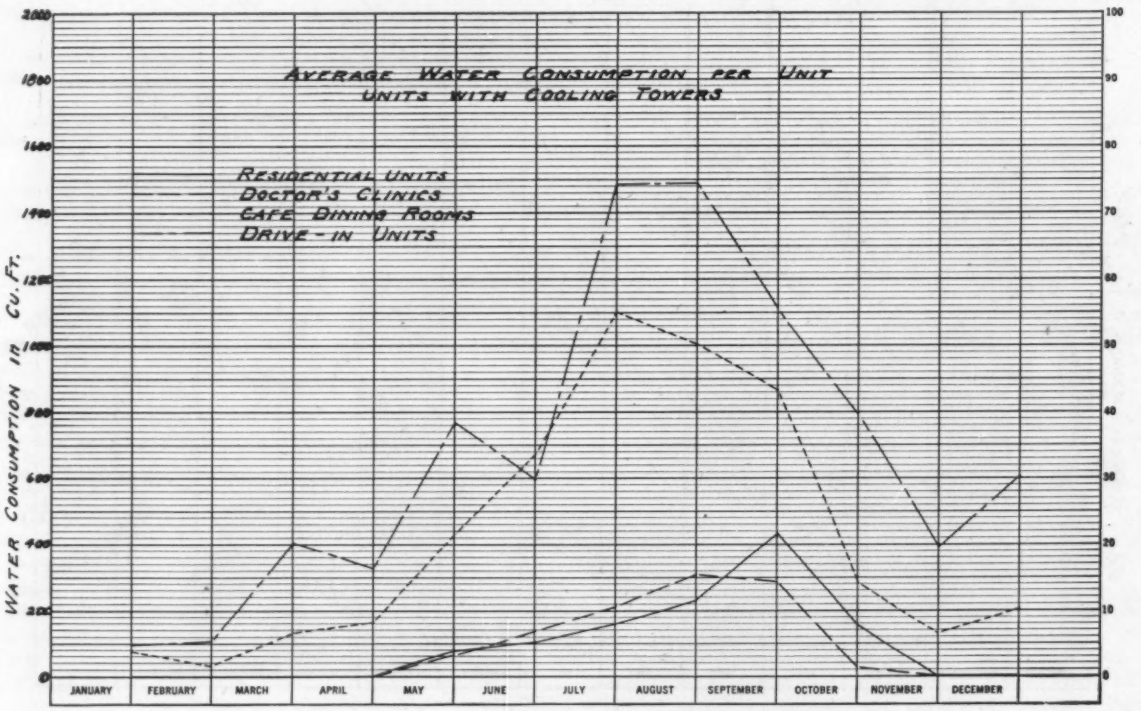


FIG. 4. Average water consumption per unit—units with cooling towers.

ing equipment has been no exception. Service requirements as a result have been high, particularly during the early period, and for some time were wholly disproportionate to revenue from gas usage. These were aggravated by lack of trained service personnel and by the necessity for gaining service experience in the field.

Some of the early "bugs" were inherent in the unit while others resulted from local conditions which affected its operation. The first models used lithium chloride as the absorbent in the refrigeration cycle. Under conditions encountered in customer installations this was often found to crystallize and plug the unit. Later units were charged with a lithium bromide solution and the trouble was eliminated. Most of the original lithium chloride units have since been replaced and the remainder will be as soon as conditions permit.

Water conditions causing liming and poor circulation were another major source of trouble. Company service engineers, finding that small amounts of excess carbon dioxide in the water pre-

vented or reduced scale formation and retarded algae growth, developed a simple device for injecting small quantities of flue gases containing carbon dioxide into the condenser water system in amounts proportionate to the water flow. This arrangement has eliminated most of the trouble from water sources.

Other items have similarly caused trouble in greater or less degree but through changes and improvements in design effected through close cooperation with the Servel Company these have been largely overcome. The war period has afforded an exceptional opportunity to acquire the needed field experience and to make the indicated modifications in design with a limited number of unit installations.

As "bugs" were eliminated, as service personnel became more proficient, and as new servicing techniques were developed, service requirements were greatly reduced. Data for the past year are most encouraging and are approaching what might be called satisfactory levels. The curves shown in Fig. 1 indicate the progress which has been made in this direction.

Despite the operational difficulties which have been encountered the over-all performance of the Servel equipment has been generally promising. Several of the present commercial users have expressed satisfaction and have indicated intentions to replace competitive equipment with the Servel units when these are again available.

Because of the pioneering character of the existing installations and lack of experience background company policy throughout the war period has been to carry the service load at no cost to the customer except for the strictly maintenance item of filter cleaning and replacement. However, cost data are being studied to determine equitable bases for charging the customer under term contracts for such items of service and upkeep as are normal to the operation of any equipment of this character, and it is expected that some form of service warranty will soon be effectuated.

During the past three or four years much informative data has been accumulated to facilitate study of the operating characteristics of the Servel unit in various types of applications. Meters were installed on most of the early installations to obtain gas, electricity, and water consumption data. Other meters were installed on some installations to indicate hours of operation on cooling and heating cycles respectively. Typical curves developed from this data are shown in Figures 2, 3, 4 and 5.

The data brings to light many interesting facts relative to operation of the units and leaves little room for questioning the desirability of the resulting gas load from a utility standpoint. As a matter of comparison the data shows that one residential air conditioner, in point of annual gas usage under Southern California conditions, is roughly equivalent to eight average domestic gas ranges or six gas water heaters, or 12 gas refrigerators. These ratios are more than doubled in some commercial installations. It is interesting to note that in the cafe dining rooms and cocktail lounges some cooling is required in every month of the year and that the annual cooling requirements range up to as high as seven times the annual heating requirements.

The high ratio of power consumption to demand makes the electric load of the Servel air conditioner a similarly attractive load for electric utilities. Analyses reported by one of the Texas utilities show a return of approximately $42.00 per year per kilowatt of demand for the Servel units as compared to approximately $26.00 per year per kilowatt of demand for comparable electric installations.

Acceptance of air conditioning generally has been well established in the commercial field and it has become almost a "must" to the successful operation of certain classes of establishments. Indications are that as time goes on it will become increasingly necessary to an increasing number of businesses. Very often it can be demonstrated to be a paying investment resulting in increased business, improved efficiency, less spoilage and the like; thus price is less of an obstacle to sales of the equipment and the market is correspondingly broadened. These factors combined appear to assure an extensive, growing commercial market for air conditioning equipment in the immediate post-war future.

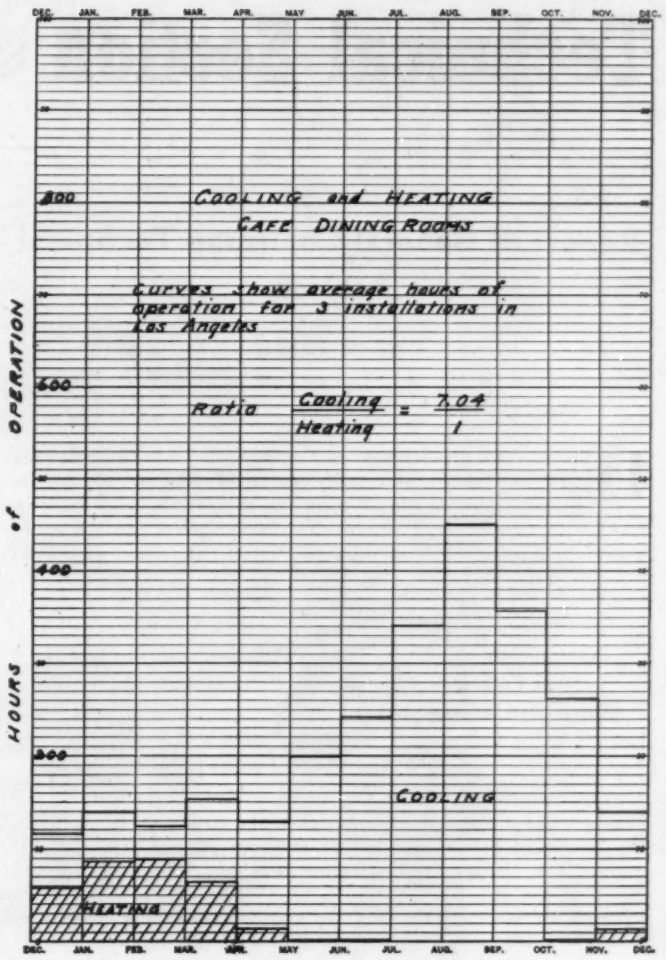


FIG. 5. Cooling and heating cafe dining rooms.

Air conditioning of residences heretofore has been generally too costly, both in cost of equipment and in cost of operation to gain a very wide acceptance, though all signs indicate that a broad market is there awaiting only the development of suitably priced equipment to satisfy its needs. At the price levels which prevailed before the war for all types of equipment it would appear that residential sales in general would be limited to houses costing upwards of $7,500.00 though this limit may be greater or less as local conditions increase or decrease the need for air conditioning. Anticipated volume production of equipment, however, should effect considerable reduction in equipment prices and should result in an ever expanding residential market.

Past experience and the indicated future of gas air conditioning in Southern California appears amply to justify continued sales efforts and the company is presently building a sales and engineering organization to provide suitable coverage in all the areas on the company system. Ultimate plans call for a dealer organization to be established as soon as market development and equipment price schedules make this economically practical. In the meantime, the gas company will do the selling job directly.

The attractive load building potentials of gas all-year air conditioning in themselves should be sufficient to encourage its active promotion by the entire gas industry. In addition gas air conditioning offers to that staid industry an opportunity to glamourize a bit and a chance to prove that it is modern and up with the times.

Technical Section

Report of General Chairman Technical Section

By W. F. Pape

Pacific Gas and Electric Company

DURING the present year the activities of the Technical Section have been necessarily curtailed because of the tremendous burden placed upon the engineering and operating staffs of our member gas companies. Nevertheless the Section organized and held five very successful subject conferences as follows:

Group	*Sponsor*
Distribution	F. A. Hough, Southern Counties Gas Co.
Transmission	R. W. Todd, Pacific Lighting Corporation
Accident Prevention	E. C. Hunt, Pacific Gas & Electric Co.
Automotive Transportation	S. B. Shaw, Pacific Gas & Electric Co.
Utilization	D. E. Farmer, Portland Gas & Coke Co.

The minutes of the first four of these conferences were mimeographed and distributed to members of the Executive Committee of the Technical Section and to all of those present at the conferences. The Utilization Conference was not held until July because of the congested condition of San Francisco hotels so the minutes of this meeting were not mimeographed but instead are being included in this volume as a part of this report.

All of the conferences were very well attended and voluntary comments indicate that this type of meeting is popular with the membership as it permits a free and informal discussion of specific problems by the men primarily concerned with them. Several interesting papers have been prepared as a result of these conferences and will appear in the Association's Proceedings.

Recommendations for future study on the part of the Section have been prepared for the benefit of those who will be responsible for the program of the Technical Section next year.

During the year the Technical Section collaborated with the California Natural Gasoline Association in the development of a standard procedure of gas measurement under pressures in excess of 500 lbs. per sq. in. The results of this study will be published by the California Natural Gasoline Association and will carry the endorsement of this Association.

Recommendations

I believe I can speak for all members of the Technical Section in recommending that the present type of conference meetings be continued. It would be helpful if the subject sponsors could meet with the Chairman of the Technical Section early in the year for the purpose of developing a well-rounded program for the year's work. Such planning would eliminate duplication and overlapping of effort and help to bring to light those problems which are in pressing need of solution. Furthermore, it should serve to stimulate presentation of outstanding individual contributions by members of the Section.

The Chairman of the Technical Section of the Pacific Coast Gas Association automatically serves as a member of the Managing Committee of the American Gas Association. In this capacity I have been impressed by the excellence of the work being done by many of the technical committees of the American Gas Association and by the fact that this work is largely unknown to many of us on the Pacific Coast because of our inability to tie in with it. I recommend that some study be given to the possibility of achieving greater cooperation between the Technical Sections of this Association and the American Gas Association, possibly through a greater interlocking of membership on similar committees. As a start toward this end, A. Gordon King, Secretary of the A.G.A. Technical Section, has courteously supplied me with copies of the minutes of A.G.A. committee meetings which I have distributed to members of our own Technical Section Executive Committee.

I wish to take this opportunity to express my appreciation to the sponsors of our several subject conferences and to those who contributed papers and discussions. I feel they have all done an excellent job and that it is due to them that the fine tradition for progressive accomplishment on the part of the Technical Section has been so well maintained.

Minutes of the Utilization Conference June 27 and 28, 1945—San Francisco

By D. E. Farmer

Chairman, Portland Gas & Coke Co.

THE meeting was called to order by Frank Pape, chairman of the Technical Section. After a welcome had been extended to the group the meeting was turned over to D. E. Farmer, Conference chairman. The following utility companies and manufacturers were represented:

Coast Counties Gas and Electric Co.
Pacific Gas and Electric Co.
Portland Gas and Coke Co.
Public Service Co. of Colorado.
San Diego Gas and Electric Co.
Seattle Gas Co.
Southern Calif. Gas Co.
Southern Counties Gas Co.
Tucson Gas Elect. Light & Power Co.
American Meter Co.
Grayson Heat Control, Ltd.
Pittsburgh Equitable Meter Co.

Introduction

Mr. Farmer felt that difficult problems face customer service departments preparatory to resumption of service operations on a peace time basis. Although difficulties have been many and varied during these war years, customers have been tolerant and costs of operation have been secondary to getting the work done. It is expected, though, that in peace time operation customers will demand more service again, not only because of a return to former habits but also because of extensive advertising depicting improved performance from appliances. Service departments must be in a position to meet this anticipated increased demand. This will necessitate the rebuilding of service personnel with attendant training programs. In addition, new post war appliances presumably beyond the blueprint stage now, may appear and add another unknown factor in the problem of rendering high quality and economical customer service.

Quality Control in Service Work

A program of work inspection has been in operation in the service department of the Southern California Gas Company for the past two years. Details are given in the 1944 Proceedings. Wm. Fisher, Jr., at this meeting reviewed experiences in this activ-

Why it will pay you to recommend...

ACCEPTANCE–American-Standard warm air and radiator heating equipment, well-known and widely advertised for more than half a century, are preferred by home-owners, by builders, by architects— by the majority of all who buy, specify, recommend or install gas-fired heating and domestic hot water equipment.

QUALITY–Back of every product in this famous American-Standard line are research, engineering and manufacturing facilities that are second to none.

SERVICE–American-Standard gas-fired units render long, low-cost service. A fact that has been proved by their many years of outstanding performance.

STYLE–American-Standard products are smartly styled. Their rich eye-appeal means more business for you.

COMPLETE LINE–American-Standard provides one source of supply for a full line of dependable gas-fired heating units, including boilers, warm air furnaces, and domestic hot water heaters.

RESPONSIBILITY–American-Standard products are sold, installed and serviced by reputable and responsible heating and plumbing contractors.

Remember, you're recommending more than gas heating when you suggest products backed by the American-Standard name. You are helping bring health and comfort to the nation's homes. *American Radiator & Standard Sanitary Corporation, P. O. Box 1226, Pittsburgh 30, Pennsylvania.*

AMERICAN-Standard
HEATING PLUMBING
Serving the Nations' Health and Comfort

ity during the past year. Two new developments have been (1) the providing of a manual for guidance of inspectors to secure a standard method of inspection, and (2) use of the Laws of Probability to predict actual work performance from a four per cent inspection sample.

Inspection standings of individual servicemen are supplied to foremen at regular intervals and use of data is left to discretion of the foreman. Detail work sheets, which are kept for six months, are available to the foremen for analysis or identification of mistakes. Office staff consists of three clerks and a supervisor plus one inspector for each 30 servicemen. No adverse reaction regarding inspection has been noticed on the customer's part. (This paper is printed elsewhere in this volume.)

New Developments in Appliance Design

Guy Corfield described the objectives of the new appliance laboratory owned jointly by the So. Calif. and So. Counties Gas Companies. Its work will supplement rather than duplicate similar work of the A.G.A. Although the A.G.A. has an extensive program each year it is restricted to fundamental research. The new laboratory will devote its efforts principally towards needed and commercially usable developments. Patent application will be sought if necessary, but all developments will be made available to industry.

One current project is the design of a top section attractive in appearance, easy to clean and free of loose parts. A new burner disc for incorporation as an integral part of a boil-over proof top burner was shown. This new disc burner is faster than current design by from 5 to 10% from either hot or cold start if the utensil is larger than the disc; if equal to or smaller than the disc the heating time is somewhat slower. (This top section is described more fully elsewhere in this volume.)

The Rochester idea of kitchen ventilation, whereby flue gases are used as a vehicle to withdraw kitchen odors as well as waste heat, is being investigated. It has been found that a lipped hood 22 in. above the "four in line" burners and extending forward about 17 in. in conjunction with a 150 cfm fan will remove 75-80% of the waste heat and 50 to 60% of the odors. Inlet opening is a horizontal slot back of and under the lip. Discharge can be either into a wall duct back of the range or to one under the floor.

A new burner cock was exhibited having five positions delivering 9000, 5800, 2800, 1800 and 900 Btu rates through a 300° rotation of the dial.

Limits of Free Service by Utilities

In defining minimum free appliance service H. W. Geyer cited G.O. 58A of the California Railroad Commission, quoting those paragraphs applying specifically to service obligations to customers. Principles contained therein are broad in scope. Policies of the companies in each case govern the amount that this basic minimum is augmented.

To illustrate the scope of free service Mr. Geyer outlined practices of his company, and brought out in the ensuing discussion practices of other companies for like activities. Except for minor details, it appeared that practices for corresponding activities are much the same. Summed up broadly, free service is rendered for gas-air adjustments, lighting of pilots, oven thermostat calibration, leak investigations, and minor mechanical adjustments. Work involving repair, replacement, maintenance, cleaning and complicated mechanical or electrical adjustments are either referred to dealers or charged for if done by the utility.

Mr. Geyer also displayed the clerical forms carried by servicemen and explained their uses.

Where Should Utility Service Stop and Dealer Service Begin

H. B. Derr defined the boundary between utility free service and that referred to dealers (or charged for if undertaken by the utility) by itemizing and assigning to either of these two classifications all ordinary service operations encountered in servicing customers' appliances. A few remaining specific operations were placed in a third group transferable to either of the foregoing two depending on the individual utility's policy. (Mr. Derr's paper appears elsewhere in this volume.)

Discussion brought forth no disagreement or major deviations indicating agreement, in general, with the division of the work. Those operations contained in the third group almost without exception are referred to dealers or charged for if done by the utility.

Instead of a limit of one hour for the purpose of controlling free time spent on a job several companies permit an initial one-half hour only, followed by any amount of additional time considered warranted after scrutiny by the office. This procedure is considered to take into account the varying abilities of servicemen and circumstances of the job.

Minimum Installation Requirements for Gas Appliances

E. C. Drew presented a set of minimum installation requirements, compiled to govern the installation of all gas appliances, except central furnaces, sold by his company. At present only central heating installations are installed in accordance with company specifications. Improved installations and performances have resulted therefrom, together with elimination of possible controversies between salesman, installer and serviceman. Now, as a result, it is proposed to adopt minimum installation requirements for all appliances to secure similar benefits. (Mr. Drew's paper appears elsewhere in this volume.)

Discussion of individual requirements produced comments as follows:

Item 1—Venting. The joint laboratory of the So. Calif. and So. Counties Gas Company was cited as stating that a common flue to two or more water heaters should have a cross-sectional area equal to the combined areas of the individual vents.

Item 5a—Flue Height. Mr. Drew pointed out that this provision conflicts with approved practice; yet it is justified, in his opinion, on the basis that an unsightly flue or chimney is avoided with only an occasional instance of improper venting resulting therefrom. In such cases, costs to the company to remedy are moderate.

Item 9b—Materials. Mr. Geyer stated that a steel, non-kinking bellows type connector with union fittings has been in use by them for connecting flush to wall ranges with excellent results.

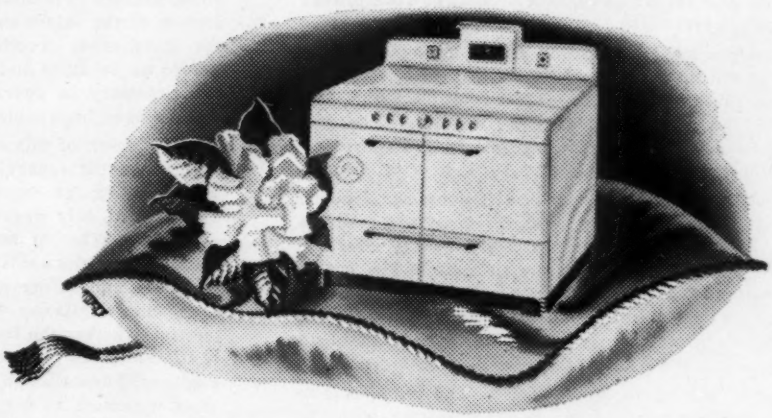
Item 18—Clearances—Floor Furnaces. This subject provoked considerable discussion involving the merits of concrete pits versus suspended pans. Pits are hard to thoroughly waterproof, it was stated, are costly and, as a consequence, may drive the customer to another installer, who will dispense with protection, thus defeating the purpose of the requirement. On the other hand, pits, when properly built, do afford reliable protection. In addition they may, on account of their cost, have the satisfactory end result of persuading the customer to choose forced air equipment instead.

The advantages of the suspended pan type of protection is its relative cheapness and greater prospect of customer acceptance rather than possible disregard of protection when the cost is high. Disadvantages are said to be a dislike by some servicemen and inaccessibility to service in contrast to the pit and trap door.

Public Relations Through Service Contacts

George Mackenzie emphasized the value and need of good public relations to the successful utility. Since most contacts with customers are made by service department employees it is essential that the impression created by these employees be favorable and complimentary to the utility. Some of the means employed by Portland Gas and Coke Company to insure successful representation of the company by employees so as to improve and maintain customer goodwill are:

1. *The providing of uniforms* for servicemen in order that their appearance will be neat and trim and distinctive. The uniforms consist of blue-gray trousers and maroon



Watch...

The demand for household Gas Appliances was never so great...the men and women of Southern California Gas Company never so active on new plans...nor the Gas Industry's research, manufacturing and sales organizations so full of promise. Things are humming for Natural Gas in Southern California. *Watch!*

What's cooking:

- Gas Appliances of all kinds now in production. (They'll be increasingly in evidence by the first of the year.)
- New Freedom Gas Kitchens—setting new standards in design, convenience and an even greater realization of the modern, practical advantages of gas.
- A new dealer plan to break within the next 90 days; "All-out" sales-promotion programs to follow.

SOUTHERN CALIFORNIA GAS COMPANY

MODERN, PRACTICAL, FLAME-PERFECT

GAS

jackets. White coveralls are carried when protection is needed for the uniforms. Total cost, including frequent dry cleaning, is about $90 per man per year. Improved employee morale plus favorable customer comment have proved the investment worthwhile.

2. *The improving of telephone technique* by use of a monitoring system. At the start 30 to 40% of the conversations were faulty. This was reduced to less than 5%. Experience has shown that such an activity should be continuous as errors begin to increase again within a short time after discontinuance.

3. *The making of follow up calls.* Voluntary telephone calls following completion of a service request are made to verify that the customer has been satisfied and to offer the service again anytime needed in the future. A girl makes 30 to 40 calls per day. She tries to dispel any thought that the customer may have that the company is checking up on its servicemen. The expressions of appreciation received from customers prove the activity to be worthwhile.

4. *Survey of all letters to customers.* The purpose is to insure that the letters will impress the customer with the idea that the company is ready and anxious to be of service.

Mr. Mackenzie asserted that each of these lines of endeavor has contributed substantially to the establishment and maintenance of good public relations in their territory.

Dust Control and Protective Devices for Pilots

C. P. De Jonge discussed the program of service filter installation in effect over a period of years in San Diego. Curves were presented showing the status of pilot outages during these years. Although no decrease was shown the fact that a low level has been maintained is indicative of the effectiveness of the filter.

The filter consists of a finger of double thickness closely woven cloth held in place in a ¾ in. by 4 in. brass nipple by a coiled spring. Installation is ahead of the service regulator; it is not intended for low pressure. Practically all of the 105,000 high pressure services in San Diego are protected. Filters are serviced at each old age meter change.

In the discussion which followed it was evident that all companies troubled with dust are actively pursuing measures to combat it. Those measures mentioned specifically are: Reduction of pipeline velocities through introduction of new feeds, installation of service filters and use of pilot filters.

Minimum Installation Requirements for Gas Appliances

By E. C. Drew

Coast Counties Gas & Electric Company

During the prewar period the Coast Counties Gas and Electric Company actively merchandised gas appliances of all types through its various commercial offices. In many cases these appliances were sold completely installed and as a result the company was responsible, not only for the equipment sold, but for its proper installation as well.

In our larger districts the majority of these installations were made by company installation crews, with the remainder being contracted to local plumbing and sheet metal firms. In smaller districts, where the volume of installation work did not justify the existence of an installation crew, all of the work was contracted to local plumbing and sheet metal firms.

Up until about 1936 the manner in which appliance installations were made was left pretty much to the judgment of the salesman selling the equipment and the men making the installation. In many cases the importance of properly engineering the appliance installation was not realized and as a result, the appliance performed unsatisfactorily or subsequently when it became necessary to service the appliance, extreme difficulties were encountered in doing so. In some cases installation men were not properly trained in the fundamentals of good installation work.

In about 1936 our company began an active sales campaign to encourage the installation of forced air central heating plants in homes of the class that had formerly been heated with individual room heaters. Planning of these installations was left to the discretion of the salesman and installer as had been the custom with the installation of other types of appliances. It was not long before we began to find ourselves with installations that were either unsatisfactory in operation or potentially hazardous or in some cases almost impossible to properly service.

As a result of this experience, a heating department was organized under the supervision of the industrial gas engineer and the sales department required that a central heating furnace could be installed only providing the installation was made in accordance with a layout furnished by this department. Minimum installation requirements were drawn up to cover this class of installation and before payment was made to the installing contractor, each installation was inspected by a heating engineer to determine whether the installation conformed to the layout and specifications. This procedure assured the customer of a properly engineered installation and aided materially in the sale of equipment inasmuch as our installation policy and sample layouts provided the salesman with valuable sales material. In fact, this policy was so successful that eventually a great many of the sheet metal contractors would not make installations of their own without one of our layouts.

During this period company installations of appliances other than forced air central heating furnaces were inspected by customer servicemen. When the commercial office was advised by the installing contractor that the installation of an appliance had been completed, an order was issued to cover the inspection of the installation by a serviceman. Whether the installation was satisfactory or not was entirely dependent upon the serviceman's interpretation of a proper installation and as a result, the standards of appliance installation varied greatly within a district or between districts. In some cases the serviceman and the installer would become involved over an installation because the salesman had outlined to the installer an installation that was not satisfactory from the serviceman's viewpoint.

Because of the excellent results of our policy in the installation of forced air central heating furnaces and in order to attain a uniformly high standard of installation for the other appliances sold throughout the company territory, it was decided that minimum installation requirements covering these appliances should be drawn up as a guide to salesmen, installers and servicemen. The attached requirements have been drawn up for the approval of management, with the thought in mind that they should be as simple as possible and only cover those points which have been a major source of trouble in the past.

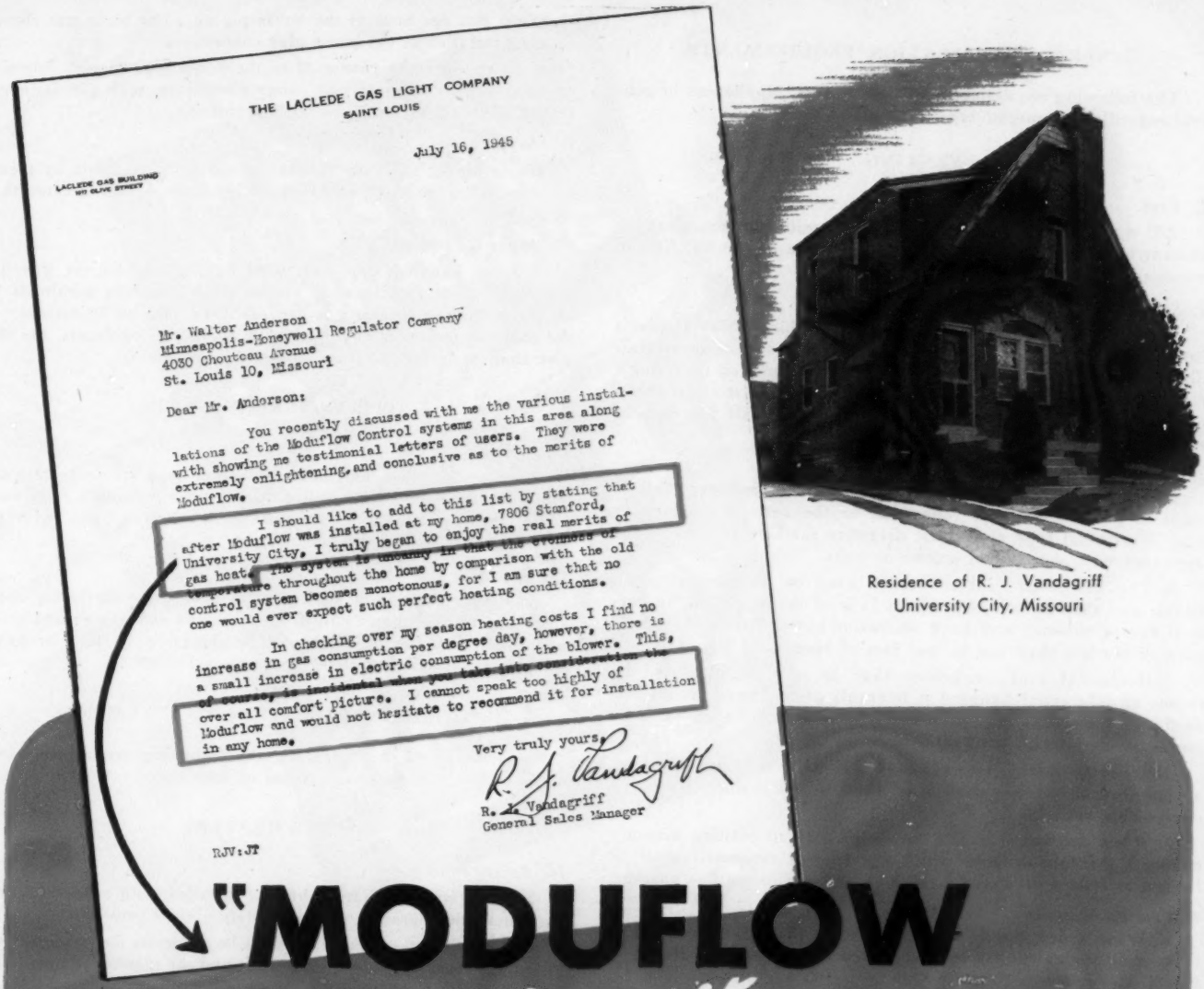
In order to secure proper interpretation of these standards it will be necessary to have training classes for the salesmen, installers and servicemen who will be involved with this type of work. With this thought in mind, various slides have been prepared, illustrating various phases of the appliance installation standards on which a complete understanding might not be attained by reading the text only.

It is felt that the use of these minimum installation standards will result in the following advantages:

1. Customers will have appliances that will give superior performance due to proper installation.
2. These appliances will be installed so as to be easily serviced.
3. Greater employee satisfaction will be attained, in that servicemen and salesmen will be guided by standards which are approved and understood by those concerned with the installation of appliances.
4. Wider acceptance of company installed appliances naturally tending to stimulate appliance sales.

COAST COUNTIES GAS AND ELECTRIC COMPANY MINIMUM INSTALLATION REQUIREMENTS FOR GAS APPLIANCES

Installation of all gas appliances, with the exception of central heating furnaces, made by company installation crews, or for the company by outside contractors, shall meet the following minimum requirements. Where local ordinances are in effect, installations must also comply with the provisions of these ordinances.



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1017 OLIVE STREET

July 16, 1945

Mr. Walter Anderson
Minneapolis-Honeywell Regulator Company
4030 Chouteau Avenue
St. Louis 10, Missouri

Dear Mr. Anderson:

You recently discussed with me the various installations of the Moduflow Control systems in this area along with showing me testimonial letters of users. They were extremely enlightening, and conclusive as to the merits of Moduflow.

I should like to add to this list by stating that after Moduflow was installed at my home, 7806 Stanford, University City, I truly began to enjoy the real merits of gas heat. The system is uniformly in that the evenness of temperature throughout the home by comparison with the old control system becomes monotonous, for I am sure that no one would ever expect such perfect heating conditions.

In checking over my season heating costs I find no increase in gas consumption per degree day, however, there is a small increase in electric consumption of the blower. This, of course, is incidental when you take into consideration the over all comfort picture. I cannot speak too highly of Moduflow and would not hesitate to recommend it for installation in any home.

Very truly yours,
R. J. Vandagriff
R. J. Vandagriff
General Sales Manager

RJV:JT

Residence of R. J. Vandagriff
University City, Missouri

"MODUFLOW BRINGS OUT *Real Merits* OF GAS HEAT!"

It's easy to see why Mr. Vandagriff's letter speaks for itself. Moduflow is an entirely new method of temperature control. Instead of the conventional "on-off" method of automatic heating, Moduflow delivers an uninterrupted flow of heat at exactly the correct temperature to satisfy the room thermostat and in the exact quantity to offset or balance the heat loss. This eliminates cold floors and provides a constant, even temperature throughout the house. It likewise permits a far better distribution of heat to all rooms.

Moduflow obviously will help you sell gas heat. The enormous number of replies from our national advertising testify to the nation-wide interest of comfort heating and Moduflow installations in all parts of the country prove customer satisfaction.

Capitalize on this Moduflow acceptance. Recommend and install Moduflow on every job. Minneapolis-Honeywell Regulator Company, 2946 Fourth Avenue South, Minneapolis 8, Minnesota. Branches and distributing offices in all principal cities.

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CONTROL SYSTEMS

GENERAL INSTALLATION REQUIREMENTS

The following requirements will apply to all appliances in general regardless of specific type of appliance.

VENTING

1. Vent

All water heaters and space heaters, with the exception of radiant heaters, shall be vented on the outside of the building in which they are installed.

2. Size

The size of the vent, flue or chimney to which an appliance is connected shall not be less than the vent collar on the downdraft diverter. When two or more appliances are connected to a single flue, the flue shall have a cross-sectional area at least equal to the cross-sectional area of the largest vent plus one-half the area of each additional vent connected thereto.

3. Vent Connection

a. The downdraft diverter supplied with the appliance shall be made a part of the vent connection to the vertical chimney or flue. Horizontal type downdraft diverters shall be secured to the appliance with sheet metal screws or bolts.

b. The horizontal vent connection shall be as short as practicable and shall be not longer than 75% of the height of the vertical flue or chimney and have an incline upward from the appliance of not less than one in. per foot of length.

c. Horizontal vent connections shall be securely supported by means of substantial hangers at intervals of not more than 10 ft. Sections of metallic vent pipe shall be secured at each joint by means of sheet metal screws.

d. If the horizontal vent connection is made with metallic pipe, a clearance of not less than 1 in. shall be maintained from any combustible material.

e. When appliances are to be vented into an existing masonry chimney, the thimble into which the vent is connected shall be located at least 6 in. above the bottom of the chimney flue passage.

4. Venting Material

a. When a new flue is to be installed, it shall be constructed of transite or equivalent material approved by the National Board of Fire Underwriters.

b. When appliances are to be vented into an existing masonry chimney, the chimney shall be carefully inspected to determine whether any obstructions are present and, if necessary, thoroughly cleaned to insure free passage of the flue gases.

5. Height

a. In the case of buildings with peaked roofs, the flue or chimney shall terminate at least 24 in. above the point of issuance from the roof.

b. In the case of buildings with flat roofs, the flue or chimney shall terminate at least 18 in. above the fire wall.

6. Location

No flue or chimney shall terminate within 4 ft. of a ventilating inlet or outlet of a building.

7. Flue Cap

The flue or chimney shall be provided with an "A" cap or equivalent vent cap designed to prevent downdrafts.

HOUSE PIPING

8. Size

House piping shall be sized to give not more than .2 in. W. C. pressure drop between its connections to existing house piping and the appliance.

9. Materials

a. All piping below the floor line of the building shall be of iron or steel and in the event the appliance above the floor level is not to be connected by means of pipe, the piping must terminate above the floor level.

b. Three-eighths in. copper or aluminum tubing in lengths not to exceed 6 ft. may be used to connect appliances with inputs up to 40,000 Btu per hour to the house piping. The main gas shutoff shall be installed at the house pipe connection.

c. Ranges may be connected to the house piping with Romaine or equivalent type semi-rigid range connectors, with the main gas shutoff installed at the house pipe connection.

10. Support

House piping shall be adequately supported to joists by means of pipe straps or plumber's tape at intervals of not greater than 10 ft.

11. Main Gas Shutoff

A lever handled stop cock shall be installed in the gas line leading to each appliance, at an accessible location, within 24 in. of the appliance, so that gas can easily be shut off if desired. In the case of appliances equipped with appliance regulators, the stop cock shall be installed upstream from the regulator.

APPLIANCE REGULATORS

12. When Required

All floor furnaces, unit heaters, booster type water heaters and heating boilers shall be installed with proper appliance regulators. (The proper appliance regulator is usually supplied with the appliance.)

13. Location

Appliance regulators shall not be installed underneath appliances nor farther than 24 in. from them and shall be vented to the combustion chamber of the appliance alongside the pilot or to the outside of the building.

SPECIFIC INSTALLATION REQUIREMENTS

In addition to the foregoing the following requirements will apply to the various specific types of appliances.

SPACE HEATERS

14. Safety Pilot

a. No heating appliance shall be installed with controls providing automatic operation unless a safety pilot is provided.

b. The pilot gas connection shall be made on the upstream side of the appliance regulator, between it and the manual control valve.

15. Automatic Control Valves

No automatic control valves shall be located underneath the casing of the heating appliance so as to be inaccessible for servicing, nor shall they be located farther than 12 in. from the appliance.

16. Thermostats

Thermostats shall be located on an inside wall, approximately 4 ft. 6 in. from the floor, in the room in which the heating appliance is located and at least 6 ft. from the appliance in a horizontal direction.

17. Control Wiring

a. All splices in the control wiring of heating appliances utilizing pilot generators shall be soldered and taped.

b. All controls shall be connected with the wire supplied by the manufacturer of the controls. In the event any additional wire is necessary, it shall not be less than No. 18 A.W.G. in size.

18. Clearances—Floor Furnaces

a. Where the distance from the ground level to the floor joists at the furnace location is more than 24 in., but the distance from the bottom of the furnace to the normal level of the ground is less than 12 in., a waterproof pit shall be provided with the following minimum inside dimensions: 12 in. from furnace to sides of pit on all sides except control side where clearance shall not be less than 24 in., and minimum clearance of 12 in. from bottom of furnace to bottom of pit. The sides of the pit shall extend approximately 4 in. above the normal level of the ground surrounding the pit.

b. Adequate provision shall be made for easy access to the furnace under the house by means of an opening in the foundation wall, or a trap door, of at least 14 in. by 24 in., located at the closest possible distance to the furnace, and a clear and unob-

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SURFACE COMBUSTION, Chicago, Denver, Pittsburgh ● OIL FIELD EQUIPMENT CO., New York

structed passageway to the furnace, at least 24 in. high by 24 in. wide.

c. Where the distance from the ground level to the floor joists at the furnace location is less than 24 in., a waterproof pit shall be provided with the following minimum inside dimensions: 24 in. from sides of furnace to sides of pit except on control side and vent side. On control side minimum clearance from side of furnace to side of pit shall be 36 in. and on vent side 12 in.; 12 in. from bottom of furnace to bottom of pit. The sides of the pit shall extend approximately 4 in. above the normal level of the ground surrounding the pit. (This type of pit is not recommended inasmuch as the cost of such an installation would in most cases approach the cost of installation of a central heating plant.)

d. Access to the pit shall be provided by a trap door of at least 14 in. by 24 in. located in the floor directly above the space provided at the control side of the furnace.

WATER HEATERS

19. Location

Water heaters shall not be installed in bathrooms or bedrooms.

20. Clearances

a. There shall not be less than 30 in. clearance between the burner access door on the water heater and any opposite wall or obstruction preventing easy access to the water heater.

b. There shall not be less than 3 in. clearance between the sides and back of the water heater and any adjacent wall or other obstruction preventing easy access to the water heater.

c. Where water heaters are installed in closets, the clearance between the front of the heater and the closet door shall be not less than 6 in.

21. Ventilation

Where a water heater is installed in a closet, or in any room having a floor area of less than 25 sq. ft., the closet or room shall be provided with 75 sq. in. of ventilating area in or near both the top and bottom of the closet or room.

Quality Control in Service Work

By Wm. M. Fisher, Jr.

Southern California Gas Company

IT WILL be recalled from the 1944 P.C.G.A. Utilization Conference at Los Angeles that Southern California Gas Company Customer Service Department Quality Control is the name for a system of organized work inspection conducted by a staff group responsible to the manager of Customer Service. A brief review of Quality Control development and organization, which was the subject of a discussion at the last conference, is included here because it may be helpful in explaining the activity and effect of work inspection during the past year. (See P.C.G.A. Proc. Vol. 35 [1944], page 116.)

The Customer Service department normally employs approximately 500 servicemen to carry out its responsibility for maintaining the proper and satisfactory operation of customers' gas appliances and of company equipment located on customers' premises. To make its service effective, the department has developed and written a comprehensive service policy and procedure which each serviceman should adhere to, so that service rendered will be consistent with the general service objectives of the company. The department also has developed a serviceman training program, dispatch routines which control the volume and flow of service work to be performed, and a work inspection program, all intended to assure the performance of service work to the desired standards of quality and effectiveness.

These primary functions perform a threefold service for line supervision throughout the company service system:

The training department makes available to line supervision new servicemen who are well grounded in necessary knowledge and who are able to go directly to work with a minimum of supervisory guidance.

The dispatch routines provide a constant and regulated flow of work to the servicemen, and relieve line supervision from this more or less clerical task.

Work inspection, or Quality Control, provides information concerning serviceman work performance so that line supervision may be aware of the quality and effectiveness of the service work being performed.

Prior to work inspection, the maintenance of adequate control over serviceman work performance was a problem of considerable importance to the department. The district service foreman has the opportunity of observing the serviceman, who works alone in the field, only for short periods at the start and end of the shift at the service base, or he occasionally can accompany the serviceman into the field to observe personally the serviceman's work procedure and his treatment of customers. But this small amount of observation was not sufficient to provide the necessary control because the servicemen still work most of the time without direct supervision, and it was the experience that deviations, sometimes extreme, existed between actual performance and the requirements of the service policy.

Factual cases of poor performance were known only where customers recorded consistent complaints, and factual cases of excellent performance were known only where customers recorded consistent praise; often the good serviceman who happened to possess a neutral personality received no publicity at all and was subject to neglect when salary increases and promotions were considered.

Spot-Check Inspection

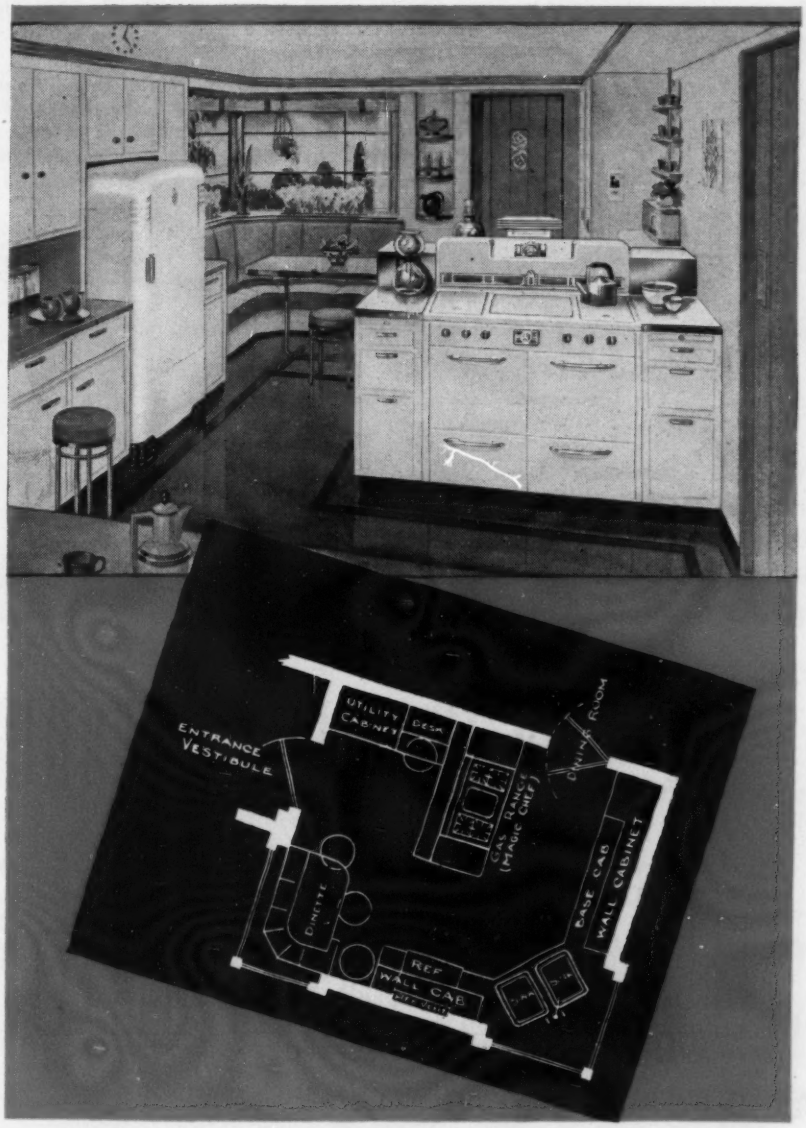
The need for more stringent supervisory control over field performance to effect better and more standard service quality and to provide proper recognition of individual performances was originally met by the organization of a spot-check system of work inspection. The operation of spot-check inspection was delegated to the individual district service foreman, and each foreman was provided with a number of sub-foremen necessary to perform the actual inspection. On assignment from his foreman, the sub-foreman sampled several days of each serviceman's work twice each year, and accompanied the serviceman in the field to observe working practice. The foreman received complete reports of this semi-annual inspection from the sub-foreman, and from these reports, conducted interviews with the serviceman to advise him of the status of his work performance and, if necessary, point out where the performance needed improvement.

This system was satisfactory in the main as long as the foreman's analysis of the spot-check findings was generalized and tempered with considerable good judgment; but the system, as any spot-check system, precluded any but very generalized performance rating because the samples of work as inspected were very small and infrequent, and the probability that the samples accurately represented total performances was uncertain. The foreman had no way of knowing just how representative the sample was, and as a result the system was subjected to criticism because of its inability to present a decisive basis for rating performances. The dissatisfaction with it among the servicemen expressed itself in charges of prejudice against the sub-foreman, who made the inspection knowing the identity of the serviceman whose work he was sampling; the foreman was dissatisfied because the results were too unreliable to warrant decisive action in cases of suspected excellent or unsatisfactory performance.

Of course, the spot-check had the advantage of its own publicity in creating better performance; the knowledge that inspection was being conducted was sufficient to improve the general level of work quality. And, too, the system at least offered a basis for generalized performance evaluation that was better accepted than the previous personal judgment founded on few facts or none at all.

SEND FOR *Magic Chef* KITCHEN PLANNING DATA

. . . It is designed to help you promote the New Freedom Gas Kitchen and Magic Chef gas ranges to architects and builders



THE DATA CONSISTS OF 4 PIECES:

1. **L898 Kitchen Supplement showing 12 different kitchen designs offering a wide variety of arrangements and utility features to choose from.**
2. **L906 Floor Plant Insert—shows the detailed floor plan of each of the 12 kitchens mentioned in Item No. 1 plus detailed plans for other sections of the kitchen.**
3. **L896 Kitchen Broadside shows 10 kitchens in full color which affords excellent opportunity to study the full effects of contrasting colors in the kitchen.**
4. **L895 Magic Chef Specification page. Gives detailed measurements on 5 different models of Magic Chef Gas Ranges.**

This program will afford you an opportunity to contact either personally or by mail the men in your community who will influence the design and construction of kitchens in new homes. This program will give you the opportunity to basically promote the New Freedom Gas Kitchen and Magic Chef, as well as other gas appliances. This data is timely and affords you still another opportunity to tie in with the big Magic Chef national advertising program. For details see your Magic Chef representative or write your nearest American Stove office.

AMERICAN STOVE COMPANY
4301 Perkins Ave. • Cleveland, Ohio
NEW YORK • ATLANTA • PHILADELPHIA • CHICAGO
CLEVELAND • ST. LOUIS • LOS ANGELES

The Symbol of "Certified Performance"

Magic Chef

RED WHEEL GAS RANGES AND HEAVY DUTY GAS COOKING EQUIPMENT

LOOK FOR THE FAMOUS RED WHEEL . . . THE MARK OF DEPENDABILITY

Quality Control Inspection

Ideas for bettering the spot-check system were considered, and it was decided to transfer inspection from a line responsibility to a functional activity responsible to the manager of Customer Service. Therefore, the present Quality Control function was inaugurated about two years ago. The sub-foremen were transferred from line supervision to the new function and reclassified as service inspectors, a small clerical staff was hired to process inspection findings and prepare reports, and a former line supervisor who was thoroughly familiar with service work was delegated the responsibility by the manager of Customer Service for the development and supervision of the function.

As a function, in general, it is the responsibility of Quality Control to conduct proper work inspection and to report periodically the status of individual and group performances to interested department supervisors, particularly to the district foremen, who as the line supervisors have direct interest in performance. Additional responsibilities of Quality Control include the maintenance of the department's personnel records, the preparation of special information concerning personnel where performance is questionable, the maintenance of close scrutiny, through its statistics, of the effectiveness of the service policy and the suggesting of desirable changes as indicated, and the giving of counsel to supervisors concerning work performance.

Inspection of performance by Quality Control is divided into three phases: Inspection for adherence to instructions and quality of the customer contact and field mechanical work, inspection for adherence to instructions and quality of clerical work, and inspection for rate of production.

Inspection of the customer contact and field mechanical work is conducted on a sampling basis by the service inspector group under the supervision of the Quality Control supervisor. Inspection is made from copies of the orders completed by the servicemen and serviceman identification is omitted from the copies; the service inspector does not know whose work he is sampling. About 4% of the inspectable field work performed is sampled. This phase of performance is the most important of the three because it is the heart of the job. On its performance hinges customer goodwill and attainment of the company's primary service objective—customer satisfaction and safety.

Inspection of the clerical work and for rate of production is conducted in the office by a clerical staff supervised by an office supervisor. The Quality Control supervisor and the office supervisor collaborate on these two phases of inspection and the results are forwarded to the Quality Control supervisor for application. Inspection of these phases is 100%; every work report is scrutinized for clerical error, for the amount of work performed, and for the time taken to do the work; the results are tabulated daily through I.B.M. procedure so that complete records are available to Quality Control for processing into its periodic performance reports.

Processing of the inspection statistics and preparation of the performance reports, which at present are issued bimonthly for all service divisions, is conducted by a clerical staff under the direction of the quality control supervisor. This clerical staff also is responsible for the selection and dispatching of work samples to be field inspected by the service inspector group.

Presentation of the performance reports is made personally by the Quality Control supervisor to the respective division managers and interested supervisors during informal meetings where report content, personnel matters, and items of special importance to the manager of Customer Service are discussed.

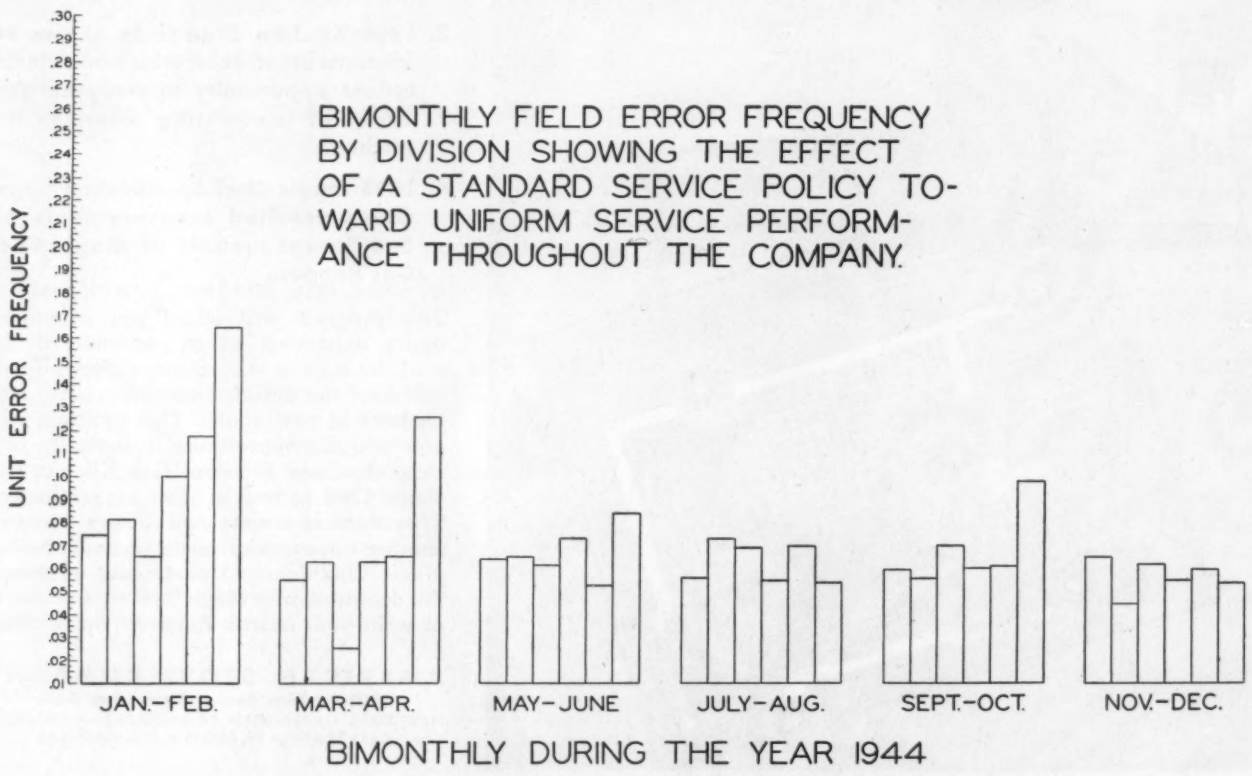


FIG. 1. INDIVIDUAL PERFORMANCE CHART

Each of the six vertical line groups represents the performance pattern of the individual at bi-monthly intervals throughout a year. The position of the first vertical line with reference to the range enclosed by the horizontal lines indicates the quality of field mechanical work. The position of the second vertical line with reference to the first vertical line indicates the quality of clerical work reporting. The position of the third vertical line with reference to the second vertical line indicates the rate of production. The first vertical line group, for example, indicates an average quality of field mechanical work, poorer-than-average quality of clerical reporting, and above-average rate of production. Descent of the groups throughout the first four bi-monthly periods indicates a trend toward poorer field mechanical work quality, with no change in clerical quality or in rate of production because the relationship of the second vertical line to the first, and the third to the second, have not changed. The somewhat radical change noted for the September-October period is a result of supervisory attention to the slipping field and clerical phases of performance. The September-October pattern indicates a return to average field mechanical quality, a bettering of clerical quality to average, and a lessening of rate of production which nevertheless is still above average.

WARTIME SAN DIEGO .... AND ITS FUTURE

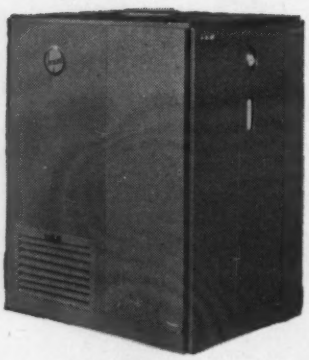
". . . . . The war's end will not find San Diego unprepared to cope with the inevitable postwar adjustment period. With community interests uniting in a common cause, the severity of the adjustment period should be greatly minimized through the retention on a permanent basis of a large part of wartime military establishments, the early resumption of tourist trade on an enlarged scale, and the intensive development of city and county resources which was interrupted by the war."*

**Quotation from the 1944 Annual Report to Stockholders of the*

SAN DIEGO GAS & ELECTRIC COMPANY

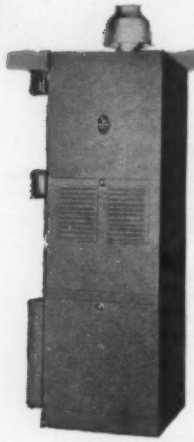
Postwar THE Most OF GAS HEATING

Boilers



Forty-two different boilers for steam and hot water heating

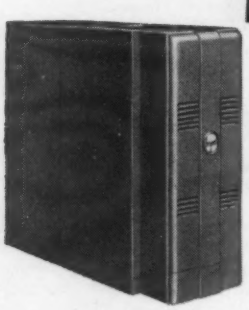
All Bryant boilers have CAST IRON sections for long life and efficient operation



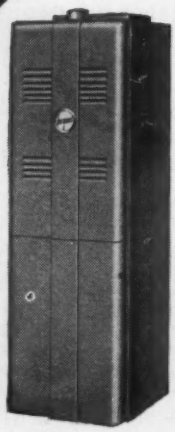
Closet space is sufficient room for the VB model with CAST IRON heat exchanger

Winter Air Conditioners

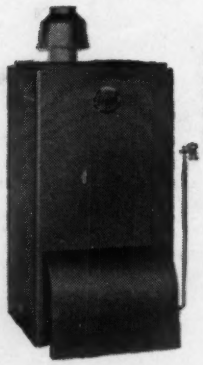
CAST IRON heat exchanger also is featured in the BA-88 model



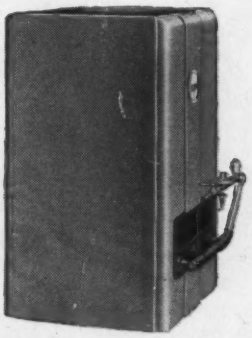
This basement-type model with STEEL heat exchanger provides complete winter air conditioning economically



The Vertical model is a moderately priced, spacesaving unit with STEEL heat exchanger

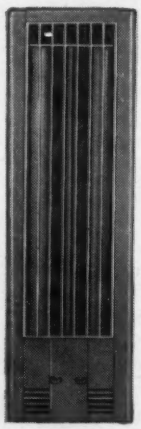


Heavy CAST IRON heating element and baffle plates assure maximum heat and long life for the GF-56 model

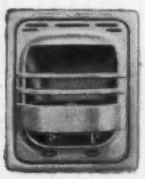


Destined to become popular for small homes heating, this STEEL gravity furnace fits the modest building budget

Gravity Furnaces

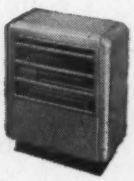


The new Panelray vented wall heater adds beauty and efficient heating to any room in the house



Bryant wall heaters fill the need for moderately priced, non-vented installations

New portable space heaters are built in modern streamline designs



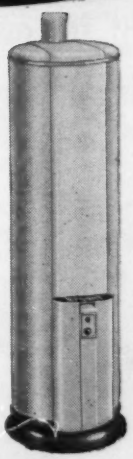
Where circulated heat is required, this Console model does the job thoroughly and efficiently

Wall and Space Heaters

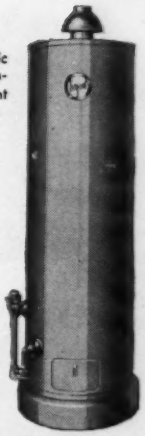
Complete Line

EQUIPMENT IN THE NATION!

INCLUDING WATER HEATERS



Six new automatic water heaters are included in the Bryant Heater postwar line

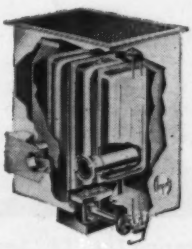


The new streamline water heater matches the modern note of many postwar home designs

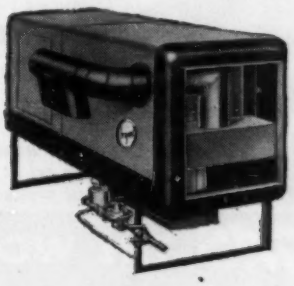
And many specialities

Conversion burners to meet postwar modernization demand

Unit heaters for garages, stores and shops



Floor furnaces in four types to fit every requirement



Forced-air, horizontal space-saver unit for attic installation

• Here it is . . . the postwar gas heating equipment you hoped would come . . . the Bryant Heater line that paves the way for aggressive dealers to go places in the greatest heating market ever opened!

No matter whether your prospect is a new home builder or is modernizing an old home, there is equipment in the improved and expanded Bryant Heater line to fit the job and make a profitable sale.

You can offer boilers with age-resisting cast iron sections, winter air conditioners and gravity furnaces in *both* cast iron and steel heat exchanger models. A group of diversified floor furnaces, wall and space heaters answers small home and individual room heating problems. Specialties, such as conversion burners, attic-installed space-saving heaters and unit heaters complete the picture to meet every heating requirement. All this, plus a new line of Bryant water heaters in a wide range of sizes and prices.

Advertising in national magazines—*more than 13,000,000 four-color printed impressions this year*—has been telling and selling the public on the advantages of buying Bryant Heater equipment, produced by the pioneers of residential gas heating. Colorful new literature and store display materials, as well as an effective radio and newspaper advertising campaign for use in *your own city,* will be ready to help you sell.

Ask the nearest Bryant Heater distributor to give you the complete story, told in the factual presentation, "Postwar Picture of Home Heating." You'll agree with hundreds of other dealers who say . . . *"now's the time to tie up with Bryant!"* Bryant Heater Company, 17825 St. Clair Ave., Cleveland 10, Ohio—One of the Dresser Industries.

bryant

GAS HEATING

LET THE PUP BE FURNACE MAN

Here's the program your dealers have been waiting for

A New Kind of Sales Plan
—SELLING 2 OUT OF 3 WOMEN FOR YOU!
GAS
DER FLAME FOR MATCH-LESS COOKING
Order this "CP" kit for every dealer now
CP
TRADE
MARK
ASSOCIATION OF GAS APPLIANCE & EQUIPMENT MANUFACTURERS

● The book and the big package of "CP" promotional material that goes with it is a *must* for every appliance dealer in America. It shows how to cash in on the tremendous market for better-grade gas ranges with the "CP" program — The Soundest Selling Idea in Major Appliance History. If you want dealer cooperation, order one of these "CP" sales makers for every dealer in your territory. It will mean stronger dealers, more better-grade gas ranges on your lines, better satisfied customers, and reduced service expense.

* * * *

Send for your Sales Kits now — one for every one of your dealers. Priced at 50¢ each from Association of Gas Appliance & Equipment Manufacturers, 60 East 42nd Street, New York 17, N. Y.

Gas Ranges Bearing The "CP" Seal Will Be Made By The Following Manufacturers:

A-B STOVES, INC.
AMERICAN STOVE CO.
CALORIC GAS STOVE WORKS
CRIBBEN & SEXTON CO.
DETROIT-MICHIGAN STOVE CO.
THE ESTATE STOVE CO.
GLENWOOD RANGE CO.
JAMES GRAHAM MFG. CO.
GRAND HOME APPLIANCE CO.
HARDWICK STOVE CO.
A. J. LINDEMANN & HOVERSON CO
O'KEEFE & MERRITT CO
ROBERTS & MANDER STOVE CO.
GEO. D. ROPER CORPORATION
STANDARD GAS EQUIPMENT CORP.
THE TAPPAN STOVE CO.
WESTERN STOVE CO., INC.
In Canada: CLARE BROS. & CO., LTD.
GURNEY FOUNDRY CO., LTD.
MOFFATS, LTD.

GAS—THE WONDER FLAME FOR MATCH-LESS COOKING

Analyzing the Sample

Initially, the results of field sampling were expressed in terms of the percentage of defective work found in the sample, and these sample percentages defective were presented to supervisors as indexes of serviceman performance. These indexes provided the supervisor with a general idea as to the effectiveness of the field work of each of his servicemen but the extent of correct sample inference under this system was limited by the knowledge that the sample percentages defective were probably only 50% accurate at representing actual work performance. One development last year, therefore, was in the application of statistics to the sampling process to enable more accurate interpretation of the sample finding.

The application of the statistical technique established a more concrete relationship between the sample findings and the overall work which the sample represented in that it provides a calculated basis for the drawing of proper inferences from sample findings.

To illustrate the effect of the statistical technique without elaborating on the theory or the sometimes laborious computation involved, the problem where a moderate sample is analyzed for its inference can be explained.

A sample of 10 items is drawn from a lot of 100 items with the object of inspecting the sample for its state of quality to get an idea as to the quality of the entire lot. On inspection, the sample is found to contain nine good items and one defective item; therefore, it can be said that the percentage of defective items in the sample is 10%.

At this point, it is likely to be concluded that the sample finding represents the lot of items as being 10% defective, and this assumption may be correct. But reflection will show also that the conclusion is improbable to some degree because of the influence of chance in the selection of the sample. There is no assurance that the state of sample quality is exactly the same as the state of lot quality. Neither is there proof that the two are not the same, because nothing is known about the 90 items not sampled. It is clear that any conclusion concerning the inference of the sample must be very general without more factual information which can be collected only by more sampling.

The sampling of 90 of the 100 items with a finding of nine defectives, or a percentage defective of 10% for the larger sample would obviously make the conclusion of direct relationship between sample finding and the state of the lot more accurate, but some doubt still would remain because the state of the 10 items not sampled is still unknown.

To make a conclusive statement of inference in this latter case without sampling 100% of the lot is relatively simple, however, from the mathematical point of view. It merely is assumed that the remaining 10 items are all defective or all good; therefore, there are either 9 or 19 defective items in all and it is known conclusively that the true percentage defective of the lot is either 9% or 19% or some percentage between the two.

It can be argued that such a conclusion, though true, is not suited for practical use because it requires excessive sampling to make the inference sufficiently accurate and even then the exact state of the lot is still unknown. It can be seen that such a true conclusion as computed from the smaller sample of 10 items would produce so wide a range of possible true lot percentage defective as to be practically useless.

Because the only way to be 100% sure of the state of lot quality is to sample the entire lot, and because 100% sampling is often unduly expensive or impossible where destruction tests are necessary, the statistical technique has been developed to make possible comparatively accurate inference from moderately sized samples.

The technique is based primarily on the application of statistical methods postulated in accordance with what commonly are termed the Laws of Chance and Probability. It does not produce answers that are 100% positive, but it approaches the true picture much more closely than can the unaided judgment, and it has proved itself an extremely reliable indicator of correct sample inference.

For instance, it is a statistical fact that small samples drawn from a lot which overall is moderately defective will contain less percentages defective than the lot more frequently than they will contain greater percentages defective than the lot. Experiment and mathematics have proven that a lot of items with an overall percentage defective of, say 10%, will yield a sample which is perfect 35% of the time, 10% defective 39% of the time, and worse than 10% defective 26% of the time, where samples of 10 items are drawn successively until the lot of items is sampled.

Therefore, odds favor the probability that a sample finding of 10% defective represents a lot of items worse than 10% defective. In the case of the 10 item sample then, there the sample percentage defective was 10%, the odds are that the lot of 100 items is more than 10% defective. Computation indicates that the more probable lot percentage defective is 15% rather than 10% in this case. Statistics thus has assisted the sampler toward more accurate inference.

Statistically, the 15% figure has a 50-50, or 50%, chance of being the true lot percentage defective because there is equal possibility that the true lot percentage defective is more or less than 15%. A 50-50 chance, however, is not too close to accuracy. If the sampler could be 90% sure of accurate inference, or in other words, if he could increase the odds to 10 to 1, that the sample inference is correct, the sample finding would have more meaning.

Application of the Laws of Chance and Probability enable the sampler to do this; it is possible to compute the accuracy of inference for any probability short of 100% through the statistical technique. For instance, if it was desired to be 90% sure of the inference of the sample found to be 10% defective, a range of inference, accurate to 90% probability, can be computed. In this case, it would be found 90% probable that the sample finding of 10% defective infers a true lot percentage defective between the limits of 5½%-20½% defective.

This relatively narrow range of inference at 90% probability as computed from the 10 item sample can be compared to the range previously computed at 100% probability (9%-19%), from the large sample of 90 items for evidence of the effectiveness of the statistical technique. It is apparent that a desire for 100% sureness can be fulfilled only by extremely large samples; if one is satisfied with lesser odds than 100%, say 90% sureness, the statistical technique can establish accurate enough inference with comparatively minute sampling.

If the statistical process, the size of the inspected sample is the factor which determines the accuracy and reliability of the relationship between sample finding and the state of the lot. For instance, if a relationship between sample finding and lot is desired to be 90% probable and to specified accuracy of inference, a sample size can be calculated to fulfill these requirements. Also, if a sample size is not changeable and it is desired to obtain more accurate inference between the sample and the lot, the closer relationship can be calculated but the probability will be less than 90% that the relationship is accurate. Conversely, the probability of accuracy may be increased to 99%, but the relationship will be more general. Both closer inference and probability can be obtained only by increasing the sample size.

Of course, if one were sure that a sample truly represented the lot from which it is drawn, probabilities and inference tolerations would be unnecessary, but because it is impossible to be positive concerning true relationship without total inspection, the next best thing is to see how close the true answer can be approached. The statistical technique establishes the relationship on a basis which enables a better than average degree of sureness that the sample answer is true, and as such it is extremely useful in assisting judgment to correct decision.

Another advantage of the statistical inspection system is its ability to control its own cost. Its reliability in providing the most certain answers is a benefit which allows the fluctuation of sample size without loss of comparable value between findings. For example, where histories of low lot percentages defective indicate a consistent better-than-standard product, the inspection sample sizes may be decreased without the loss of knowledge sufficient to maintain control over quality. Although a decrease in sample size with retention of the same probability of accuracy will create more general inference, the pattern of broader inferences is still sufficient to indicate whenever quality is slipping and the sample size can then be returned to normal for more effective control.

For the supervisor's reports, the inference of the sample finding for each serviceman as to the actual state of his overall field performance is computed in accordance with the statistical technique and the range of lot percentage defective inferred is plotted as a vertical line on a chart against the company average lot percentage defective range. Thus the supervisor can see at a glance the level of the serviceman's actual field performance to known

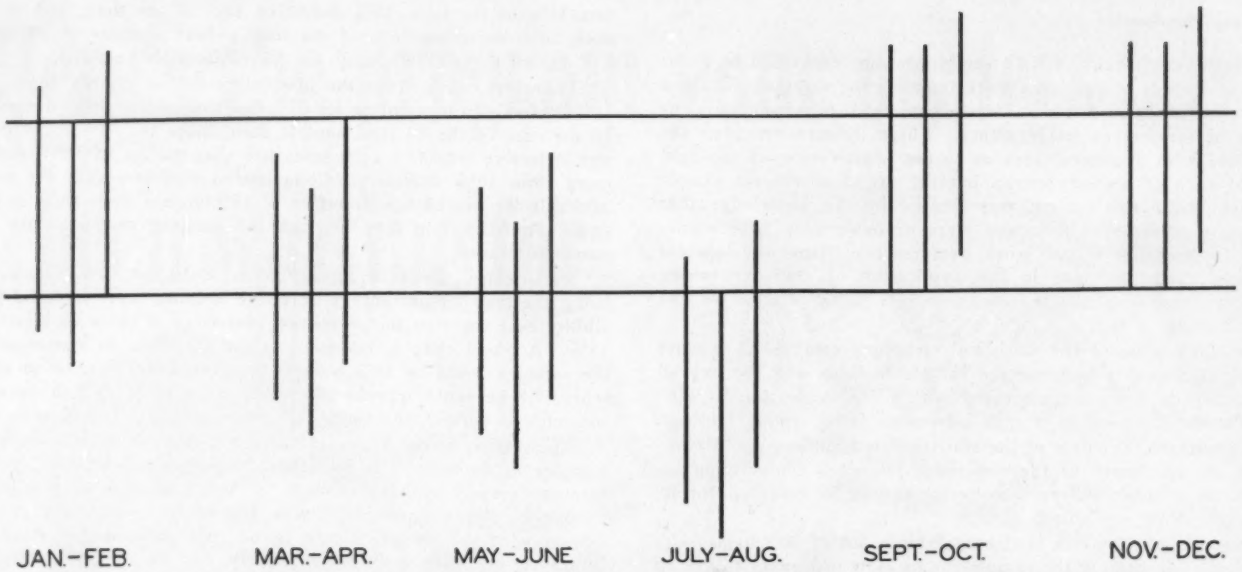


FIG. 2. EFFECT OF CENTRALIZED INSPECTION TOWARD UNIFORM UNDERSTANDING OF SERVICE PROCEDURES

The effect toward uniform service work performance throughout the company is illustrated by a leveling off of field error frequencies of the various service divisions as soon as uniform inspection began to point out differences in application of the service policy at the beginning of the year 1944. As supervisory work progressed through 1944, in accordance with knowledge of the reasons for deviation from standard procedure, it is apparent that a measure of uniformity in the application of service was attained toward the end of that year.

probability and accuracy, where before he had only the sample percentage defective and less knowledge as to how the sample represented overall performance.

A second major development during the past year was the writing of inspection standards to insure findings that are based on a common understanding of what constitutes a defective element of work. At the outset of the Quality Control program, it was discovered that there were as many different opinions as there were service inspectors as to the acceptability of work. A defect in one service inspector's opinion was immediately disputed by another who believed the element acceptable. It can be seen that much argument could be started with a question about the proper characteristic for a range top burner.

The inspection standards manual outlines in all necessary detail the differences between acceptable work and defective work. Every service inspector is required to adhere to the standards regardless of his personal opinion. As insurance against inspection deviation, a method for checking service inspector adherance to the standards has been developed.

Training New Servicemen

In addition to its primary function as the work inspection agency for the department, Quality Control participates in the training of new customer servicemen. Applicants for the serviceman job must successfully complete a training course before they are awarded the serviceman classification and allowed to work without direct supervision. It is not expected that the new servicemen perform as effectively as those with considerable job experience because it takes some time to master the many details involved in service work. The amount of experience required to attain standard job proficiency could only be guessed at, however, prior to the development of performance statistics through standard work inspection by Quality Control.

It is now possible, through the statistics being developed, to obtain a much more accurate idea as to the average progress of the new servicemen from total inexperience to standard proficiency. The performance of every new serviceman is sampled in accordance with regular inspection procedure except that the results are reported to the district foremen at shorter intervals so that progress may be known frequently enough to make any necessary assistance toward standard proficiency more timely and so more effective.

Levels of performance which the average new serviceman can be expected to reach through progress from month to month are now possible of fairly reliable prediction and it is expected that future performance statistics concerning new servicemen at the various months of experience will increase the reliability of conclusion that a new employee is making slower than average, average or better than average progress.

These new-servicemen performance statistics also reflect the effectiveness of the training course to a certain extent; they have been useful for appraisal of the training course, and have indicated the emphasis or the deletion of training material which proved to be too lightly discussed or was unnecessary.

Finally, the statistics make it possible, through the reverse application of error trends, to evaluate the importance of any detail of the service job as to the degree of training emphasis necessary.

Results Obtained by Quality Control

The organization of work inspection on a functional basis brought about a major improvement in customer service along operational lines; it is effecting a more uniform understanding of the service policy and procedures, in all service areas of the company and thus making for the standard application of service that was intended. Because the sampling is continuous and company-wide, deviations from standard requirements by individuals or groups can be noted in time to make attention effective before undesirable trends become established and so harder to correct.

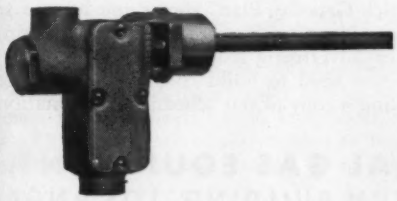
The collection of performance statistics by a single group also has made possible a close judgment of the effectiveness of the service policy itself. A major section of the policy was recently revised on the basis of evidence of ineffectiveness revealed by the inspection statistics.

The accuracy with which inspection findings can be expressed and the impersonal nature of inspection has resulted in a rating of performances that is acceptable to the service group in general. Servicemen have accepted the program primarily on the basis of its impartial and standard technique; supervisors have accepted it because it is effective in indicating the status of performance to degrees of accuracy not before possible. It makes the foreman's job easier by providing him with a method for gauging the effectiveness of his own supervisory efforts. Before Quality Control, the foreman could only guess at his results; he now can analyze his effectiveness to a much closer degree.

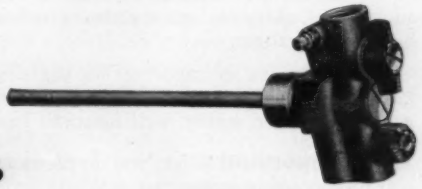
"From Weapons to Controls!"

In the Titan Valve factory that means speedy reconversion for the manufacture of TITAN WATER HEATER CONTROLS

The process will not be long for some TITAN CONTROLS have been made during the Emergency—in fact, production of Titan Controls will be governed largely by the supply of materials—the faster they are received, the faster quantity production of Titan Controls can be resumed.



TITAN
WATER HEATER CONTROLS



We suggest placing your orders as far in advance of your needs as possible.

THE TITAN VALVE & MANUFACTURING COMPANY

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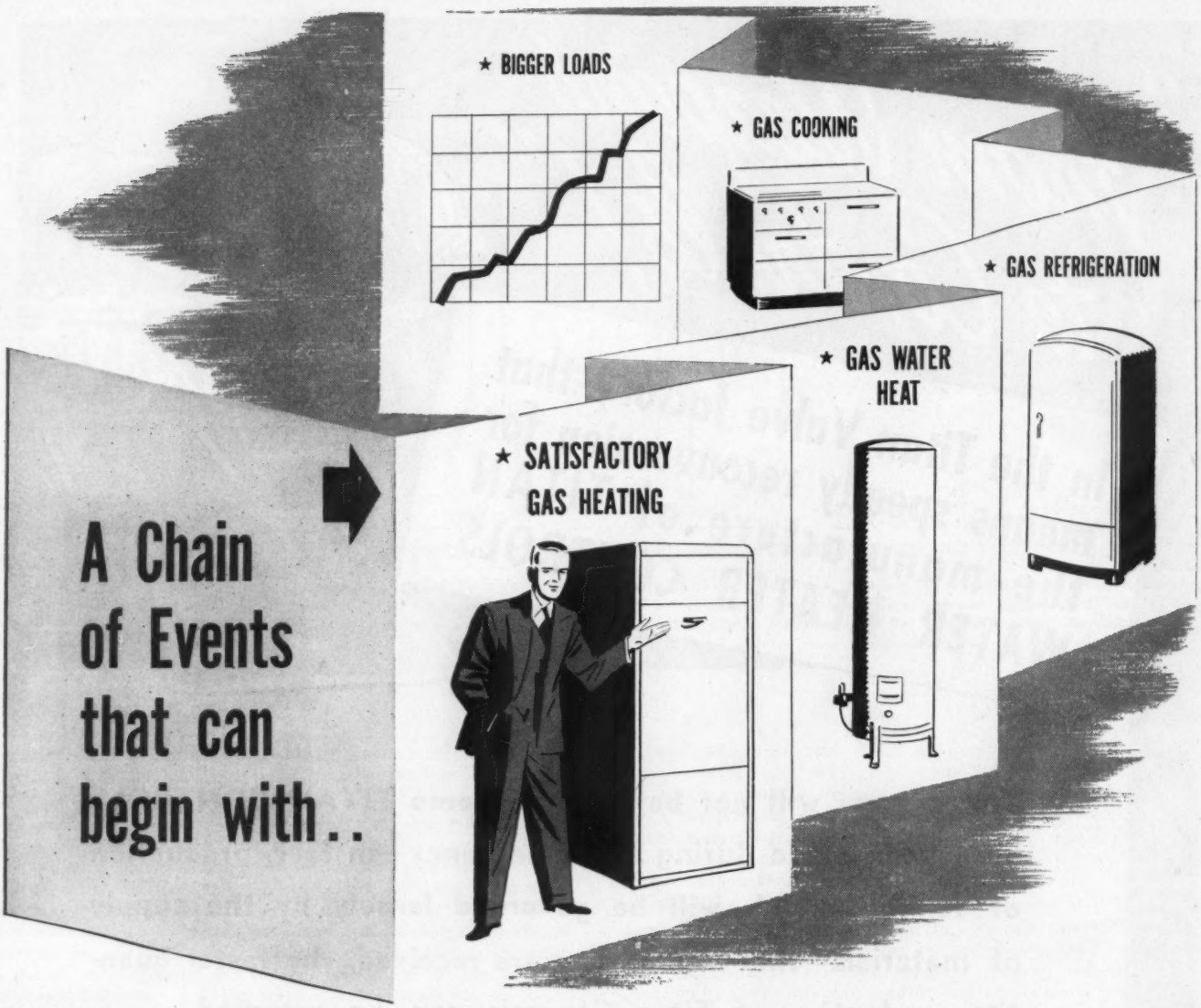

★ BIGGER LOADS
★ GAS COOKING
★ GAS REFRIGERATION
★ GAS WATER HEAT
★ SATISFACTORY GAS HEATING
A Chain of Events that can begin with..

Why is it that gas heating can so often lead to *further* use of gas in a home? Simply this: Gas heating, because it is generally so highly satisfactory, develops strong consumer preference for gas over other kinds of fuel. And this preference results in the ready adoption of *additional* gas appliances such as refrigerators, water heaters, and ranges.

That's why it's so important for utilities to promote reliable gas heating equipment. It can pave the way for wider use of gas—and bigger, steady, well balanced loads for you.

This is important! When you do promote gas heating, be sure you promote equipment that will bring comfort and solid satisfaction to home owners. You can depend on Surface Combustion for equipment proved in performance—equipment that is the result of constant research and development for more than 30 years.

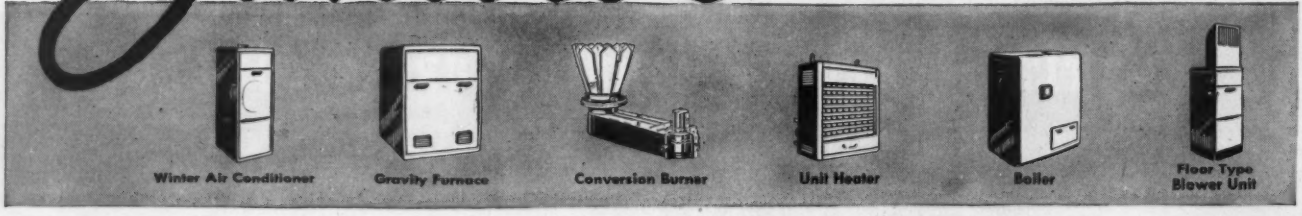
HERE'S HELP IN PROMOTING GAS FOR ALL USES! Janitrol's "Quick-Getaway Plan" shows you how to set up and operate a Home Planning Bureau, outlines supporting promotional activities, advertising material, merchandising programs —everything you need to build consumer preference for gas. Write requesting a copy of our scheduled presentations in your area.

NATURAL GAS EQUIPMENT, INC.
PETROLEUM BUILDING, LOS ANGELES 15
PACIFIC COAST REPRESENTATIVES

SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO

Janitrol

GAS-FIRED HEATING EQUIPMENT



To make clearer the assistance of Quality Control to the foreman, it might be explained that the statistical sampling technique points out undesirable work trends before they become serious enough to require drastic action. Successive performance charts will indicate trends to the worse before a performance actually becomes sub-standard, and the foreman can analyze for causes of the trend to correct it before the case becomes serious.

Perhaps one of the most important advantages of this inspection system is its influence on the methods of supervision. The knowledge that the sample is not necessarily a direct representative of the true picture emphasizes the caution that should be exercised against hasty conclusion; the supervisor who realizes that the individual occurrence is not necessarily representative of the true performance is less apt to place himself in an embarrassing position with his employees. The application of statistical methods illustrates that the sample can be trusted for true representation only within certain limits of accuracy and even then the representation is only probable.

Cost Control

It was mentioned before that the statistical inspection system has the ability to control its own cost by fluctuating the amount of inspection in accordance with the reliability of the answers desired. A year of statistical Quality Control in the customer service department has indicated that inspection can be decreased for a small group of servicemen because the normal sample size has indicated consistent excellent performance. Consistent sampling will be continued for this group, but the sample size will be reduced to maintain only the minimum of control necessary to indicate continuation of the excellent trend.

Inspection cost was decreased initially by the change from the "spot-check" system. Inspection coverage formerly averaged about four jobs a day. Service inspectors now average about 13 jobs a day. It must be mentioned, however, that the service inspectors as sub-foremen performed miscellaneous supervisory duties in addition to inspection, some of which now are assumed by the foreman, and others are now performed by centralized clerical staffs; the service inspector performs inspection only.

Utility Service Versus Dealer's Service

By HARVEY B. DERR

Pacific Gas and Electric Company

WEBSTER'S definition of service is "The performance of labor for the benefit of another or at another's command." While the majority of the utilities' customers do not "command" service, most of them expect service of a nature that will allow them to receive full benefit from their appliances and the gas fuel. The importance of this service to the utility should not be underestimated, because it contributes to a more extensive use of gas.

A good service rendered by competent servicemen is also a recognized asset to the utility, in the interest of good customer relations. It is not the intent of this discussion to promote super service, but to present my views on the limits of good service of a standard quality.

It is difficult to make a hard and fast rule defining where free utility service should stop and dealer service should begin, but in general it should be limited to adjustments, with all repair or maintenance referred, whenever possible, to dealers or service organizations, except for some small repair items which will be enumerated later which may be expedient for the utility to supply.

In the event that a competent dealer is not available and it is necessary for the utility to undertake the work, it should be on a charge basis comparable to the prevailing rate for such work.

It must be acknowledged that much of the necessity now, for a utility to undertake repair work is due to the shortage of competent help caused by abnormal conditions, which will largely disappear after the war. At this time, however, the need for a utility to do repair work would be controlled by the following:

a. Does the utility service policy cover repairs?

b. Are competent dealers available in the area?

c. Do dealers in the area want this repair business?

Most utilities have service policies controlling this service and these policies are often given publicity to acquaint the customers and dealers with their limitations.

Since free service calls by a utility represent a monetary expenditure, it is necessary that a maximum allotted time be fixed for domestic customers, to control this expense. Thus, one hour's time per call seems reasonable for domestic customers and generally is ample for adjustments. If more than this allotted time is estimated to be necessary to make the adjustment, the work should be referred to a dealer or done on a charge basis by the utility. Due to the specialized service work necessary and large revenue received, commercial and industrial customers should not be limited to the same extent, but should be allowed ample time so that necessary adjustments can be made to maintain a maximum of efficiency and safe operation.

The providing of a satisfactory adjustment of new or used appliances which are sold by a dealer, should be a part of the dealer's contract with the customer. It is felt that the dealer has a definite responsibility in the appliance which he sells and should see that it is in perfect operating condition before turning it over to the customer and making it a responsibility of the utility. It has been the experience of some gas utilities who have made a practice of adjusting new appliances, sold by dealers, that very often new equipment has had faulty parts and when the dealer was advised of this by the owner, they were told to call the utility for satisfaction, as the part was probably made defective by the utility serviceman. There should be one exception to the above rule and that is when, due to the lack of experience, the dealer asks for help from an expert serviceman so that in the future the dealer will be familiar with the problem and be able to do the work satisfactorily.

Care should be exercised when referring the customer to a dealer for work not done by the utility. It is the opinion of the writer, that in cases where special knowledge is required, only competent dealers be recommended, as poor customer relations could result if the work was done unsatisfactorily, upon the utility recommendation, by the neighborhood dealer with little or no experience in the problem involved. If several competent dealers are located in the community, their names should be given to the customer to avoid the accusation that the utility was discriminating among the dealers.

It is the writer's opinion that in the interest of economy to the utility and continuity of service to the customer, certain small parts should be furnished by the serviceman when making a call at the customer's request. These small inexpensive parts furnished free, would eliminate the necessity of the customer calling a dealer, and having to pay a minimum charge, which would necessarily appear large for this small repair service. These small parts consist of ratchet arms for three speed gas control valves, diaphragms for throttling type gas thermostat valves, pilot tips, small parts used in pilot controls, leather thermostat seats and water heater thermostat gaskets. It is felt that by furnishing the above mentioned parts free when doing service work, many future calls will be eliminated because it is often the case that when temporary minor repairs are made, it is a comparatively short time before the customer again calls for service. If the small repair part had been supplied when the first minor temporary repair was made the customer would have received an economical repair and the utility in many cases would be relieved of later calls.

Service work comprising adjustments and repairs can be segregated in the following three classes:

a. The type of free service normally given by the utility.

b. The type of service work done on a charge basis or referred to a dealer.

c. The questionable type of service work that could be done as free service by the utility or referred to a dealer, depending upon conditions.

Probably the best way to illustrate these three groups, would be to list the types of prominent gas burning equipment and classify the work necessary to maintain economical and satisfactory service. This to some extent will determine the point where free utility

service stops and where the work is referred to a dealer. There will be some borderline cases and these are classified as questionable, each case to be judged on its merits.

1. Industrial and Commercial Steam and Water Heating Boilers and Controls.

Free service to customers using large boilers and employing full or part time operators or engineers, can be lessened somewhat by instructing and utilizing the customer's employees in making adjustments and doing much of the work listed below, since the employer expects much of the work, listed as free service, to be done by the operator or engineer. As a result, service calls to large commercial and industrial establishments, many times, result only in the making of recommendations and giving advice.

Free service which should be given by the utility on request:

1. Make combustion test.
2. Set damper and louvres.
3. Adjust and clean burners.
4. Change orifice sizes to increase or decrease gas rate.
5. Adjust aquastats, pressure controls, thermostats and steam regulators.
6. Reset time switch.
7. Oil and service motor and diaphragm gas valves.
8. Grease gas valves.
9. Change position of pilots if necessary.
10. Test exposed house lines and fittings for gas leaks.
11. Replace fuses on control circuits.
12. Make minor repairs to exposed control wiring.
13. Repair minor gas leaks.
14. Set and adjust time switches.
15. Bleed air from radiators.
16. No maximum service time limit should be placed on commercial or industrial installations.

Work to be referred to a dealer or done by utility on a charge basis when no competent dealer is available.

1. Repair steam, water or gas leaks.
2. Replace rusted out or broken fittings or parts.
3. Repairs to steam regulators.
4. Repairs to electric controls and replace mercury tubes.
5. Replace or repair burnt out pilot controls.
6. Replace burnt out pilots.
7. Replace burnt out control transformers.
8. Replace or repair vents on radiators.
9. Replace diaphragms on gas valves and steam regulators.

The following items are of a questionable nature and can be done free by the utility or referred to a dealer, depending upon the individual utility's policy.

1. Fill boiler with water.
2. Clean combustion space and tubes.
3. Overhaul low water cutout.
4. Clean and flush boilers.
5. Clean gauge glass.

2. Central Furnaces, Floor Furnaces and Controls

Free service which should be given by the utility on request:

1. Clean and adjust burner.
2. Clean and adjust all electric furnace controls and gas valves.
3. Re-fuse control circuit.
4. Reset time switch.
5. Grease gas cocks.
6. Oil motor gas valves, in conjunction with other work.
7. Replace pilot tips.
8. Relocate position of pilots if necessary.
9. Service and light pilots.
10. Test heating elements for leaks.
11. Test house lines, fittings and controls for gas leaks.
12. Adjust furnace to Btu input rating.
13. Make minor repairs to exposed control wiring.
14. Clean and adjust thermocouple pilots.
15. Adjust thermocouple controlled gas valve.
16. Check voltage of thermocouple circuit with milivolt meter.
17. Clean and adjust ignition spark plugs.
18. Service floor furnace wiring (wires disconnected, etc.).
19. Furnish ratchet arms and make minor repairs to 3-speed gas valves.
20. Install pilot line filters and orifices where needed to improve service.
21. Furnish free lighter rods.
22. Investigate and advise a remedy for poor draft conditions.
23. Advise the customer of the economical and safe method of operating the appliance.

Work to be referred to a dealer or done by the utility on a charge basis when no competent dealer is available:

1. Installation of equipment.
2. Replace electric controls.
3. Replace defective control parts.
4. Replace burnt out control transformers.
5. Replace ignition coil box.
6. Remove for repair and reinstall time switch.
7. Replace diaphragm in thermocouple controlled domestic control valve.
8. Clean cold air return and heat runs.
9. Repair and replacement of defective lines and fittings.
10. Replacing or repairing defective vent pipe.
11. Repairing defective heating elements.
12. Clean soot from vents and chimneys.
13. Any service requiring more than the maximum time allowance.

Service work of a nature which could be done free by the utility or referred to a dealer depending upon the individual utility's policy:

1. Oil and clean fans and motors.
2. Clean and replace filters.
3. Repairing and cleaning of burners and controls that have been flooded.
4. Replace indicating globes.
5. Replace mica in sight holes in floor furnace caps.
6. Clean floor furnace element.
7. Repair appliance regulator.

The general opinion is that the regular periodic oiling and cleaning of fans and fan motors should be done by someone other than the utility serviceman because of the responsibility placed on the utility by the customer for any future trouble with this equipment. Many conditions contribute to the failure of fans and motors, some of which are listed below:

1. Over oiling.
2. Under oiling.
3. Over fusing.
4. Defective bearings, etc.

The responsibility for any of these causes of motor or fan failure could be placed on the utility due to lack of understanding and knowledge on the part of the owner.

3. Circulating Heaters and Controls

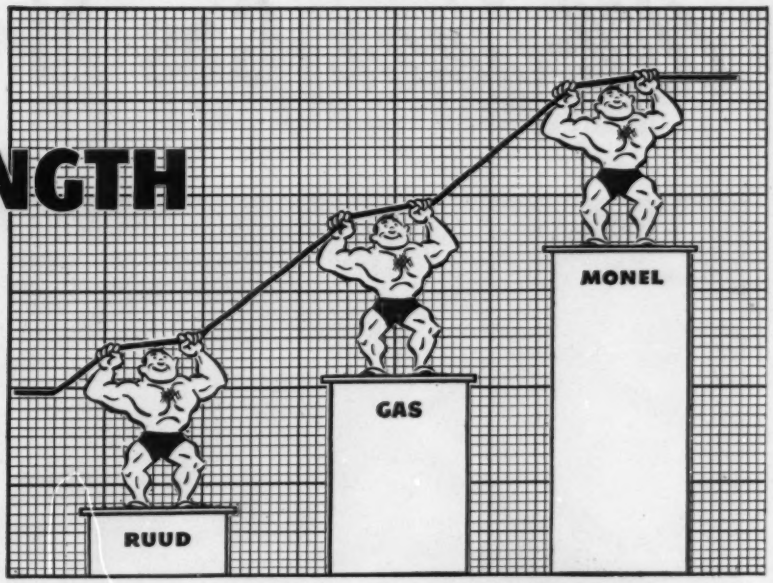
Free service which should be given by the utility on request:

1. Adjust and clean burner.
2. Grease gas valve.
3. Replace pilot tip.
4. Relocate pilot when necessary.
5. Adjust pilot control.
6. Replace diaphragm in space heater throttling thermostat.
7. Repair minor gas leaks.
8. Adjust gas to input rating.
9. Test piping and fittings and repair any minor gas leaks.
10. Convert from liquefied petroleum gas.

Work to be referred to a dealer or done by the utility on a charge basis when no competent dealer is available:

1. Installation of heater.
2. Replace defective fittings and parts.
3. Repairs to heating elements.
4. Clean vent or chimney.
5. Any service requiring more than the maximum time allowance.

Here's TRIPLE STRENGTH *to* BOOST *the* LOAD!



Are you looking over the field... trying to line up the *right* appliances for post-war sale?

Now is the time to consider the *triple-strength* story behind Ruud... *GAS*... and Monel.

When you handle Ruud Automatic Gas Water Heaters, every customer gets *more* than just a water heater. He enjoys the extra comfort and convenience known only to those who have *perfect* hot water service.

And these 3 powerful factors work to bring your customers this perfect service:

1. ***RUUD,*** a recognized leader in the field, has manufactured quality water heaters since 1889. Ruud makes *only* water heaters, and makes them only for...
2. ***GAS,*** the blue ribbon fuel, which—as we keep reminding your customers through national advertising and promotion—is clean, convenient, economical...and *dependable.*
3. ***MONEL,*** the rustproof nickel alloy used for Ruud tanks. Water always comes out as clean as it goes in. Monel tanks are long-lasting and trouble-free; they reduce service and maintenance problems.

Count on Ruud-Monel performance to build prestige and good-will for *GAS.* There's a model for every household, as well as for many commercial uses.

Get set to cash in on this triple-strength line. Investigate now. *No other water heater can offer you as much!* Your inquiry will receive immediate attention.

H_2 HOT STUFF

George Westinghouse was an inventor of gas equipment before he turned to electricity. And one of his right-hand engineers in those days was Edwin Ruud, inventor of the Ruud Automatic Gas Water Heater.

★ ★ ★

Thirty-four years later, there was another Ruud-Westinghouse tie-up when Westinghouse used one of the first of all commercial programs on the air—the Ruud Light Opera Hour—in its first experiments with shortwave broadcasting between Pittsburgh, Pa. (KDKA), and Springfield, Mass. (WBZ).

★ ★ ★

With new automatic clothes and dishwashers on the way—with new homes to have more bathrooms and lavatories—with the growing public consciousness of the importance of cleanliness to health—the automatic gas water heater rates as one of the most important of all post-war home appliances. Sell a good water heater—sell Ruud-Monel.

★ ★ ★

A national magazine says that the average American housewife walks more than 3,000 miles a year. In many a home, a Ruud-Monel will reduce that figure by 500-1000 miles . . . easily . . . simply by having hot water on tap at all times, at all faucets, without thought or attention.

★ ★ ★

Recommended for insomnia—a warm Ruud-Monel bath for 20 minutes. Pat dry, drink something hot and go to bed.

★ ★ ★

The new Ruud Multi-tube Automatic Gas Water Heater is now in production. Nineteen sizes are made to serve many commercial and industrial requirements. Write for a catalog.

RUUD MANUFACTURING COMPANY
PITTSBURGH 1, PA.

RUUD GAS MONEL... perfect partners for *Automatic Hot Water Service*

All-Year Gas Air Conditioning

. . . A New Way to Dramatize "GAS—THE MODERN FUEL"

Only the Servel unit provides all 6 functions needed to bring "New Quality of Living" to tomorrow's homes

Now the Gas Companies have another big opportunity to sell the modernity of gas and gas service. The Servel *All-Year* Gas Air Conditioner is entirely new and different. It represents a completely new concept in living comfort . . . a concept which marks it as the most modern, up-to-date equipment of its kind.

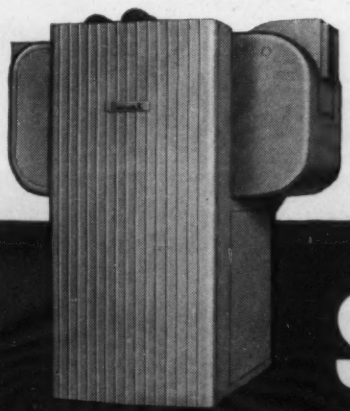
For the Servel unit—and the Servel unit alone!—provides all six vital functions of all-year air conditioning *in one unit.* It cools and dehumidifies in summer, heats and humidifies in winter, filters the air and circulates it at room temperature between seasons. All six functions are regulated by one simple central control, the "Selectrol."

In short, tomorrow's homeowner can enjoy an entirely "New Quality of Living," thanks to the Servel *All-Year* Gas Air Conditioner. With the flip of a finger, he can select just the climate he wants indoors the year round, no matter what the weather outside!

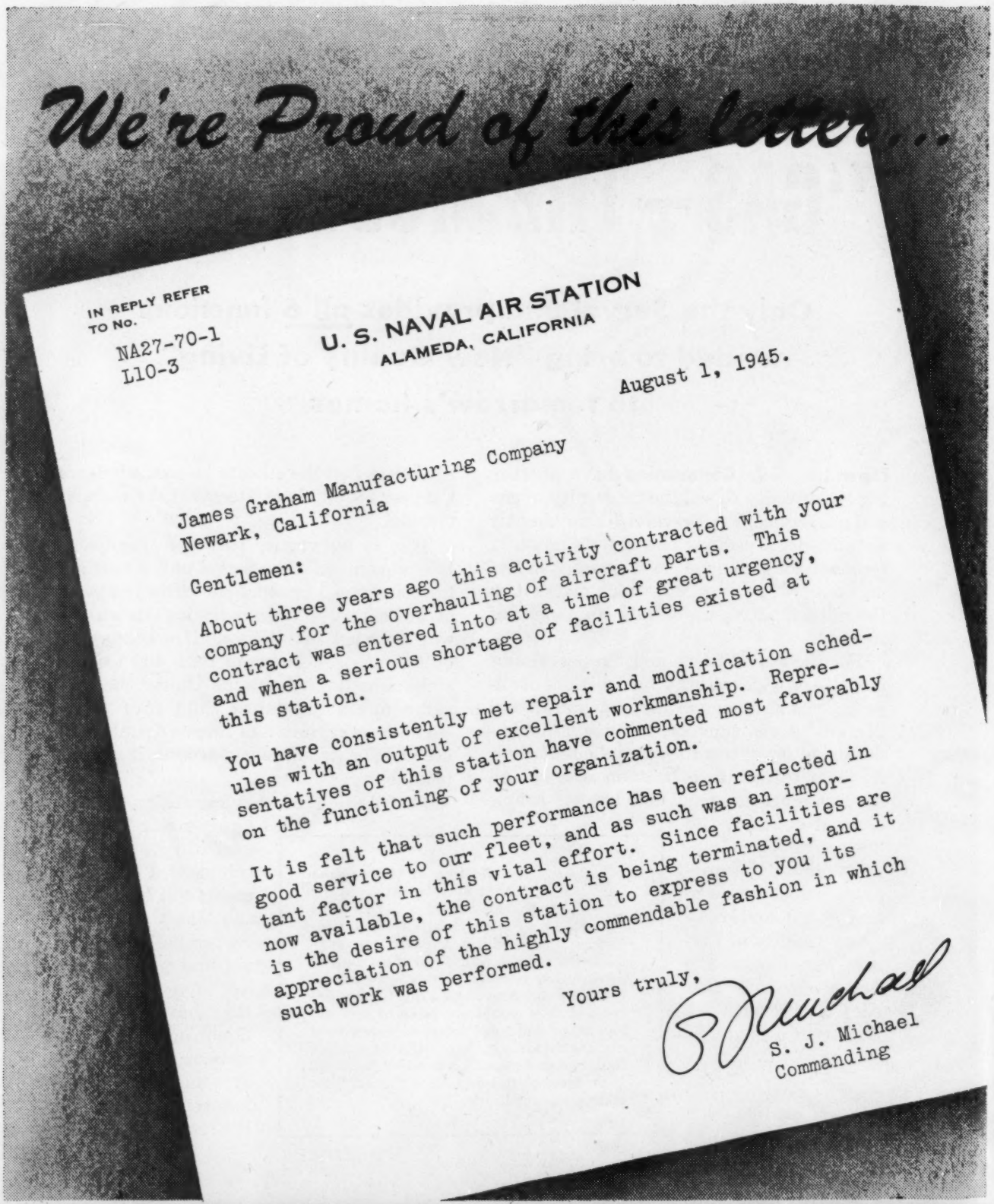
This is no vague, post-war possibility. It's proven fact! The Servel unit was ready for commercial production—after ten years of laboratory and field testing—when the war diverted materials and machinery to other purposes. In more than 400 test installations throughout the United States—some operating more than four years—the Servel unit has received universal acclaim for its efficiency, economy, and dependability.

Distribution of this revolutionary new equipment for new and old homes and commercial establishments will be through the Gas Companies. By properly displaying and promoting it in the years to come, they have an exceptional opportunity to increase their customers' acceptance and appreciation of gas as the modern fuel.

Indication of the demand that may be expected for the Servel *All-Year* Gas Air Conditioner is afforded by impartial surveys made during the war. 54% of a group of prospective homebuilders contacted by the National Association of Homebuilders said they would not build or buy unless they could get *complete* year-round air conditioning. McCall's Magazine found that 29% of its readers listed all year air-conditioning as a "must" for their post-war homes.



SERVEL, Inc. EVANSVILLE 20, INDIANA


We're Proud of this letter...
IN REPLY REFER TO No.
NA27-70-1
L10-3
U. S. NAVAL AIR STATION
ALAMEDA, CALIFORNIA
August 1, 1945.
James Graham Manufacturing Company
Newark, California
Gentlemen:
About three years ago this activity contracted with your company for the overhauling of aircraft parts. This contract was entered into at a time of great urgency, and when a serious shortage of facilities existed at this station.
You have consistently met repair and modification schedules with an output of excellent workmanship. Representatives of this station have commented most favorably on the functioning of your organization.
It is felt that such performance has been reflected in good service to our fleet, and as such was an important factor in our vital effort. Since facilities are now available, the contract is being terminated, and it is the desire of this station to express to you its appreciation of the highly commendable fashion in which such work was performed.
Yours truly,
S. J. Michael
Commanding

WEDGEWOOD THE MODERN GAS RANGE

JAMES GRAHAM MANUFACTURING CO.

LOS ANGELES ★ SAN FRANCISCO ★ NEWARK, CALIFORNIA ★ PORTLAND, OREGON

Service work of a nature that could be done free by the utility or referred to a dealer, depending upon the individual utility's policy:

1. Disconnect for summer.
2. Repair mica glass in doors.
3. Repair appliance regulator.

4. Ranges and Controls

Free service which should be given by the utility on request:

1. Adjust top and oven burners including by-pass.
2. Test and adjust oven thermostat by hot check method.
3. Adjust top burner pilots.
4. Adjust pilot flash tubes.
5. Adjust pilot controls.
6. Install pilot filters when necessary.
7. Test fittings and line for gas leaks.
8. Repair minor gas leaks.
9. Drill burner ports if necessary.
10. Convert from liquefied petroleum gas, orifices only to be furnished by utility.
11. Reset clock oven control.
12. Instruct the customer in operating the gas range.

The cleaning of foodstuff from top burners should not be done by the utility serviceman. The customer should be advised of how to do this work, in an attempt to prevent repeat calls each time food boils over on the burners.

Work to be referred to a dealer or done by the utility on a charge basis when no competent dealer is available:

1. Installation of range.
2. Repair or replace oven lining.
3. Replace oven door springs.
4. Repair sprung oven doors.
5. Lower range burners.
6. Repair or replace range parts.
7. Repair to clock oven controls.
8. First satisfactory adjustment on new or second-hand equipment when sold by a dealer.
9. Any service requiring more than the maximum time allowance.

Work of a questionable nature that could be done free by the utility or referred to a dealer, depending upon the individual utility's policy:

1. Clean burners of foodstuff.
2. Remove for repairs and reinstall clock oven control.
3. Level oven racks.
4. Level range.
5. Minor repairs to oven thermostats (binding or leaking parts when testing control).

5. Automatic Storage Water Heaters

Service which should be given free by the utility on request:

1. Clean and adjust burners.
2. Adjust and clean thermostat.
3. Check for gas leaks in fittings and line.
4. Furnish and install small pilot control parts to eliminate call back request for service.
5. Furnish and install thermostat gaskets.
6. Repair minor gas leaks.
7. Install pilot filters when necessary.
8. Adjust to input rating.
9. Convert from liquefied petroleum gas.

Work to be referred to a dealer or done by the utility on a charge basis when no competent dealer is available:

1. Installation of appliance.
2. Replace or repair defective thermostat.
3. Replace defective tank.
4. Replace rusted out or defective fittings.
5. Repair water leaks.
6. Repair all but minor gas leaks around fittings and controls.
7. Any service requiring more than the maximum time allowance.

Work of a questionable nature that could be done free by the utility or referred to a dealer depending upon the individual utility's policy:

1. Clean soot from water heater shell.
2. Repair small water leaks in lines and fittings.
3. Replace drain cock washer.
4. Replace pilot control when furnished free by dealer.
5. Remove and clean flue baffle.
6. Drain and flush tank.

In some communities, city ordinances forbid anyone but licensed plumbers from connecting or disconnecting water heaters. This to some extent relieves the utilities of the responsibility of referring the customer to a dealer.

6. Instantaneous Automatic Water Heaters

Free service which should be given by the utility on request:

1. Clean and adjust burners.
2. Clean exterior of water coils.
3. Adjust thermostat and clean seat.
4. Adjust pilot control.
5. Furnish pilot tip.
6. Repair minor gas leaks at controls.
7. Adjust water flow.
8. Adapt from liquefied petroleum gas.

Work to be referred to a dealer or done by the utility on a charge basis when no competent dealer is available:

1. Install appliance.
2. Repack and clean water motor.
3. Install or repair worn or broken parts.
4. Repair water leaks.
5. Repair all but minor gas leaks at appliance controls.
6. Replace or clean water coils.
7. Any service requiring more than the maximum time allowance.

7. Gas Refrigerators

The refrigerator presents a somewhat different problem. Some utilities are the dealers for this appliance and in this case should do all of the service work necessary to keep the refrigerator in operation. Beyond a certain warranty period the customer should expect to pay for repairs which normally would have been referred to a dealer. Where the utility is not the dealer the following service practices should be in effect.

Free service which should be given by the utility on request:

1. Clean and adjust burner.
2. Adjust minimum flame.
3. Adjust appliance regulator.
4. Clean soot from generator.
5. Relight burner.
6. Convert from liquefied petroleum gas if parts excepting orifice are furnished.

Work to be referred to a dealer or done by the utility on a charge basis when no competent dealer is available:

1. Install appliance.
2. Change unit.
3. Change thermostat.
4. Repair or replace defective parts of refrigerator.
5. Replace burner control.
6. Adjust thermostat.
7. Any service requiring more than the maximum time allowance.

Service work of a questionable nature which could be done free by the utility or referred to a dealer depending upon the individual utility's policy:

1. Level refrigerator.
2. Clean refrigerator flue.
3. Clean radiator fins of lint.

It is advantageous to both the utility and dealer that a spirit of cooperation exist between them. The dealer and the utility both have a product to sell at a profit. Through this spirit of cooperation a dealer can be of great assistance to the utility in the promotion of a wider use of gas. Some dealers insist that they have a right to certain service repair work, in the interest of promoting their business. Recognizing this fact, the intent of this paper is to promote a better understanding between the utility and the dealer.

Natural Gas Production and Utilization in California (1906-1944)

By ROY M. BAUER
Southern California Gas Company

GENERAL

PREVIOUS report (1) gave California production and utilization statistics, with tables and graphs. A brief history of the major producing areas was also included.

This report not only brings the previously published information (2) up to date, but also elaborates on certain phases of the information. Extensive repressuring of oil fields by oil companies and use of underground storage reservoirs by gas companies are new innovations during recent years.

The need for crude petroleum and its products for military uses has raised production to great heights in recent months. This, in turn, has greatly increased total gas production.

A list of producing fields, the discovery dates, and peak natural gas production in many of the oilfields are shown in Table No. 1.

TABLE NO. 1. OIL AND GAS FIELD DISCOVERY DATES AND PEAK NATURAL GAS PRODUCTION. STATE OF CALIFORNIA.

Field	*County*	*Discovery Date*	*Peak Net Formation Gas*	
Northern—Central California				
Afton	Glenn	Feb., 1944	(a)	
Chico	Butte	Jan., 1944	(a)	
Colusa	Sutter	Oct., 1944	(a)	
Corning	Tehama	Oct., 1944	(a)	
Dixon	Solano	Aug., 1944	(a)	
Honker	Solano	Jan., 1945	(a)	
Kirby Hills	Solano	Apr., 1944	(a)	
Lodi	San Joaquin	Apr., 1943	(a)	
Marysville Buttes	Sutter	Aug., 1937	(a)	
McDonald Island	San Joaquin	June, 1936	(a)	
Oro Bend	Glenn	Apr., 1944	(a)	
Rio Vista	Solano, Sacramento and San Joaquin	(1) June, 1936 (2) Aug., 1943	17,477,163	Jan., 1945
Roberts Island	San Joaquin	Aug., 1942	(a)	
Suisun Bay	Solano	Apr., 1944	(a)	
Tompkins Hill	Humboldt	Sept., 1937	(a)	
Thornton	Sacramento	July, 1943	(a)	
Tracy	San Joaquin	Aug., 1935	(a)	
Vernalis	San Joaquin	Jan., 1941	(a)	
Willows	Glenn			
San Joaquin Valley				
Alpaugh	Kings	Sept., 1944	(a)	
Bowerbank	Kern		(a)	
Buena Vista Hills	Kern	(1)....., 1909	?(a)(aa)(m)	
		(2) Mar., 1944	(b)(n)	Mar., 1944
Bellevue	Kern	May, 1944	(b)	
Burrel	Fresno		(b)	
Buttonwillow	Kern		(a)	
Canal	Kern		(bc)	
Coalinga Extension (South)	Fresno	(1) July, 1938	(b)	
Coalinga Extension (North)	Fresno	(2) Apr., 1939	(b)	
Coles Levee (South)	Kern	(1) Nov., 1938	(a)(bc)	
Coles Levee (North)	Kern	(2) Jan., 1939	(a)(bc)	
Elk Hills	Kern	(1) Jan., 1919	(a)(b)(n)	1921
	Kern	(2) Feb., 1920	(b)(n)	
Gill Ranch	Madera	Apr., 1943	(a)	
Greeley	Kern	(1) Dec., 1936	828,180	Dec., 1936
	Kern	(2) June, 1938	(b)	
Helm	Fresno	Oct., 1941	(b)	
Kettleman Hills—North Dome	Kings and Fresno	(1) Oct., 1938 (2) Feb., 1938	15,986,436 (b)	Sept., 1930
Kettleman Hills—Middle Dome	Kings	Dec., 1931	650,689	May, 1933
Lanare	Fresno	May, 1943	(b)	
Maricopa Flats	Kern	Sept., 1928	295,539	June, 1930
Moffatt	Madera	Sept., 1943	(a)	
Mountain View	Kern	Nov., 1930	1,850,279	Dec., 1935
North Belridge	Kern	(1) Oct., 1930	1,511,765	Oct., 1930
	Kern	(2) June, 1932	4,724,667(bc)	June, 1932
Paloma	Kern	June, 1934	(a)	
	Kern	Aug., 1939	(b)	
Pleasant Valley	Fresno	Feb., 1943	(b)	
Raisin City	Fresno	June, 1941	(b)	

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TABLE NO. 1 (CONTINUED). OIL AND GAS FIELD DISCOVERY DATES AND PEAK NATURAL GAS PRODUCTION STATE OF CALIFORNIA.

Field	*County*	*Discovery Date*	*Peak Net Formation Gas*	
			Mcf./Mo.	*Month Year*
Rio Bravo	Kern	Nov., 1937	634,150	Apr., 1945
Riverdale	Fresno	Dec., 1941	(b)	
Semitropic	Kern	Mar., 1935	(a)	
Strand	Kern	June, 1939	(b)	
Ten Sections	Kern	June, 1936	1,671,799	Mar., 1943
Trico	Tulare and Kern	Nov., 1934	(a)	
Wasco	Kern	Apr., 1938	(b)	
Wheeler Ridge	Kern	Nov., 1922	?	
Williams	Kern	May, 1942	(b)	
Coastal				
Capitan	Santa Barbara	Oct., 1929	90,026	Oct., 1938
Del Valle	Los Angeles	Sept., 1940	(b)	
Elwood	Santa Barbara	July, 1928	1,455,758	May, 1930
La Goleta	Santa Barbara	Aug., 1929	(aa)	
Newhall-Potrero	Los Angeles	May, 1937	(bc)	
Oak Canyon	Los Angeles	July, 1941	(b)	
Orcutt	Santa Barbara	1903	?	1908
Padre Canyon	Ventura	Feb., 1936	(b)	
Rincon	Ventura	Dec., 1927	216,985	Oct., 1938
San Miguelito	Ventura	(1) Nov., 1931	404,984	Mar., 1944
		(2) Apr., 1944	(b)	
Santa Maria Valley	Santa Barbara	Sept., 1934	(b)	
Shiells Canyon	Ventura	(2) Apr., 1911	211,356	Mar., 1937
South Mountain	Ventura	Apr., 1916	?	?
Temescal	Ventura	Nov., 1924	?	?
Ventura Avenue	Ventura	(1) Sept., 1916	?	?
		(2) Jan., 1925	8,070,889	Oct., 1929
		(3) Sept., 1937	(b)	
Los Angeles Basin				
Aliso Canyon	Los Angeles	(1) Oct., 1938	(b)	
		(2) Mar., 1940	(b)	
Brea-Olinda	Los Angeles and Orange	May, 1897	1,219,287	Mar., 1927
East Coyote Hills	Orange	Mar., 1911	?	?
West Coyote Hills	Los Angeles and Orange	Apr., 1909	2,015,000	Oct., 1918
Dominguez	Los Angeles	Sept., 1923	2,605,246	Mar., 1925
El Segundo	Los Angeles	(1) Aug., 1935	488,565	Oct., 1937
		(2) Jan., 1940	(a)	
Huntington Beach	Los Angeles	(1) Aug., 1920	5,300,000	Sept., 1923
		(2) Apr., 1933	2,691,374	July, 1934
Inglewood	Los Angeles	(1) Sept., 1924	2,371,685	Sept., 1925
		(2) Sept., 1940	(b)	
Long Beach	Los Angeles	(1) June, 1921	12,271,970	Dec., 1923
		(2) Dec., 1927	11,368,819	Oct., 1928
Montebello	Los Angeles	(1)....., 1892	?	?
		(2) Feb., 1917	422,054	Dec., 1926
		(3)....., 1935	614,110	Oct., 1936
		(4) Apr., 1939	3,381,759	Jan., 1940
Playa del Rey	Los Angeles	(1) Dec., 1929	1,741,275	Nov., 1930
		(2) Nov., 1934	1,444,566 (aa)	July, 1935
Potrero	Los Angeles	Apr., 1928	159,570	Aug., 1930
Richfield	Orange	Mar., 1919	1,015,847	Aug., 1927
Rosecrans	Los Angeles	May, 1924	1,729,297	Aug., 1925
Santa Fe Springs	Los Angeles	(1) Oct., 1921	15,810,000	Oct., 1923
		(2) July, 1928	20,915,927	Feb., 1930
Seal Beach	Los Angeles and Orange	Aug., 1926	3,178,764	Oct., 1927
Torrance	Los Angeles	(1) June, 1922	1,730,430	Apr., 1924
		(2) Oct., 1937	559,399	Oct., 1938
Wilmington	Los Angeles	June, 1936	(b)	

(a) Dry gas—utilized as required.

(aa) Has underground storage project.

(b) Recent development—operations on M.E.R.* basis.

(bc) Recent development—has repressuring project.

(n) Has U. S. Naval Reserve.

(1) Signifies first major development.

(2) Signifies second major development.

(3) Signifies third major development.

(4) Signifies fourth major development.

* Maximum Efficient Rate of production.

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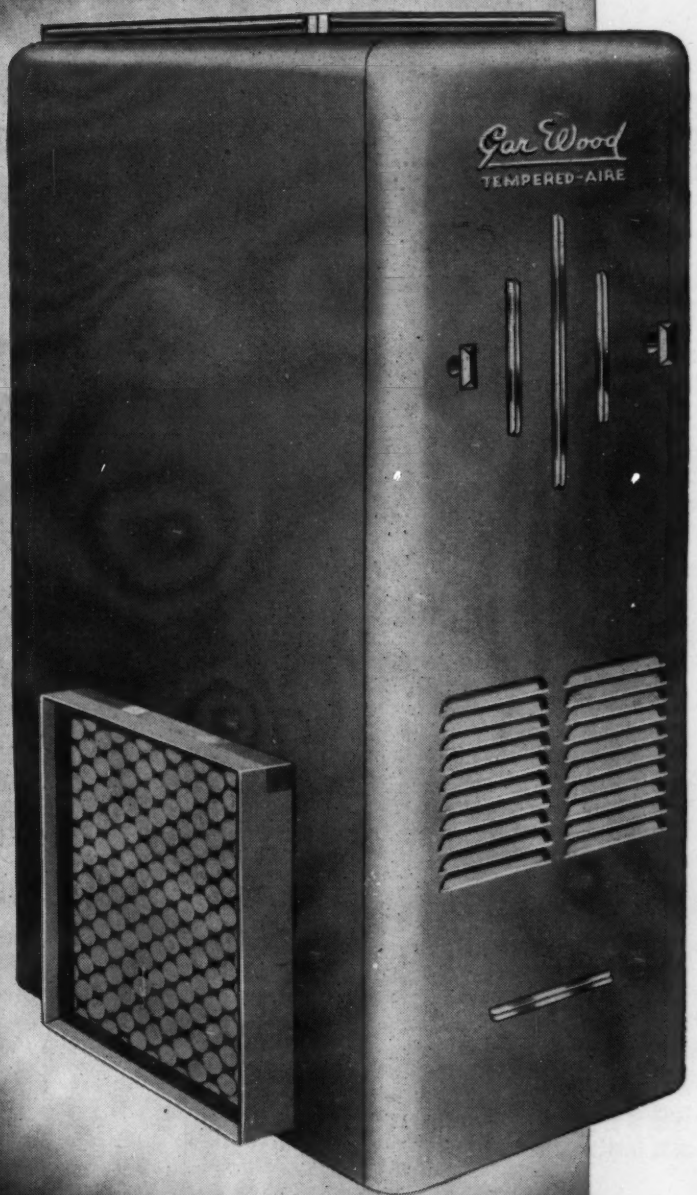

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TABLE NO. 2. NATURAL GAS PRODUCTION AND UTILIZATION—STATE OF CALIFORNIA

Year	Net Production from Formation (Mcf.) Oilwell Gas L. A. Basin	Coastal	S.J.V.	Sub-Total	Dry Gas	Total Net Prod.**	Utilization*	Unconserved Mcf.	Unconserved Percent	Crude Oil Production in Barrels
Prior	26,842,000	24,326,000	14,144,000	65,312,000	.....	65,312,000	457,200	64,854,800	99.3	129,462,510
1906	6,410,000	7,840,000	6,215,000	20,465,000	.....	20,465,000	153,000	20,312,000	99.3	32,623,229
1907	8,500,000	13,100,000	6,970,000	28,570,000	.....	28,570,000	230,000	28,340,000	99.2	40,102,512
1908	10,850,000	13,850,000	9,220,000	33,920,000	.....	33,920,000	479,000	33,441,000	98.6	48,306,737
1909	11,850,000	12,820,000	14,620,000	39,290,000	1,305,000	40,595,000	2,324,000	38,271,000	94.3	58,191,723
1910	12,590,000	12,440,000	32,064,000	57,094,000	10,866,200	67,960,200	2,764,000	65,196,200	95.9	77,697,568
1911	14,060,000	12,260,000	40,155,000	66,475,000	7,035,359	73,510,359	6,390,000	67,120,359	91.3	83,744,044
1912	12,618,000	11,570,000	47,346,000	71,534,000	5,653,797	77,187,797	9,355,000	67,832,797	87.9	90,074,439
1913	15,466,000	10,360,000	56,225,000	82,051,000	6,754,850	88,805,850	11,035,000	77,770,850	87.6	97,867,184
1914	20,610,000	8,010,000	66,065,000	94,685,000	7,453,116	102,138,116	17,829,000	84,309,116	82.5	103,623,695
1915	17,395,000	8,340,000	52,540,000	78,275,000	4,925,662	83,200,662	21,891,000	61,309,662	73.7	89,725,776
1916	18,205,000	8,234,000	53,180,000	79,619,000	7,222,680	86,841,680	31,643,000	55,198,680	63.6	91,976,019
1917	23,824,000	10,761,000	53,295,000	87,880,000	10,910,890	98,790,890	49,427,000	49,363,890	50.0	97,781,574
1918	30,215,000	12,985,000	48,825,000	92,025,000	11,205,302	103,230,302	39,719,000	63,511,302	61.5	102,643,415
1919	31,783,000	11,927,000	46,260,000	89,970,000	26,024,988	115,994,988	55,607,000	60,387,988	52.1	101,907,729
1920	27,486,000	11,937,000	56,525,000	95,948,000	22,263,979	118,211,979	66,041,000	52,170,979	44.1	105,618,706
1921	37,060,000	11,550,000	68,462,000	117,072,000	13,011,307	130,083,307	75,942,000	54,141,307	41.6	114,566,901
1922	79,314,000	10,420,000	56,150,000	145,884,000	14,229,938	160,113,938	84,580,000	75,533,938	47.2	139,626,876
1923	267,360,878	10,215,939	44,628,639	322,205,456	11,670,988	333,876,444	131,434,000	202,442,444	60.6	263,728,895
1924	195,898,953	10,712,866	54,324,739	260,936,558	14,850,207	275,786,765	189,692,000	86,094,765	31.2	230,063,117
1925	144,936,871	23,826,679	51,694,672	220,458,222	5,197,777	225,655,999	187,789,000	37,866,999	16.8	230,147,342
1926	133,832,603	44,821,211	44,399,055	223,052,869	7,319,608	230,372,477	204,915,000	25,457,477	11.1	224,117,013
1927	149,307,963	75,227,557	37,666,607	262,202,127	4,566,263	266,768,390	212,897,000	53,871,390	20.2	230,751,463
1928	193,051,160	79,808,905	39,294,757	312,154,822	2,435,219	314,590,041	251,252,929	63,337,112	20.1	231,982,597
1929	380,277,428	101,542,752	80,130,551	561,950,731	2,323,265	564,273,996	355,531,160	208,742,836	37.0	292,036,911
1930	270,688,764	80,349,480	196,947,582	547,985,826	6,131,075	554,116,901	322,149,891	231,967,010	41.9	228,099,899
1931	144,350,346	72,550,562	170,592,318	389,493,226	1,766,587	389,259,813	316,891,787	72,368,026	18.6	188,829,032
1932	98,553,027	49,931,602	131,833,952	280,318,581	1,757,520	282,076,101	262,013,774	20,062,327	7.1	178,127,794
1933	89,417,740	46,066,840	135,894,183	271,378,763	2,475,582	273,854,345	259,360,995	14,493,350	5.3	173,083,319
1934	90,078,148	46,054,542	147,002,539	283,135,229	4,964,075	288,099,304	269,524,394	18,574,910	6.4	175,508,566
1935	96,193,181	45,117,467	165,974,310	307,284,958	11,830,174	319,115,132	296,045,463	23,069,669	7.2	207,832,131
1936	95,849,089	50,408,972	192,073,298	338,331,359	5,532,936	343,864,295	319,403,271	24,461,024	7.1	214,773,315
1937	97,599,617	53,613,727	191,914,268	343,127,612	11,636,440	354,764,052	335,800,628	18,963,424	5.3	238,520,383
1938	115,687,077	50,565,405	195,737,666	361,990,148	13,845,341	375,835,489	337,601,673	38,233,816	10.2	249,749,246
1939	126,157,742	48,954,780	173,600,019	348,712,541	27,138,085	375,850,626	342,545,260	33,305,366	8.9	224,354,048
Cumulative Total	3,094,318,587	1,102,499,286	2,781,970,155	6,978,788,028	284,304,210	7,263,092,238	5,070,714,425	2,192,377,813	30.2	5,387,245,708

Source of Data:

Gas production and utilization figures 1906-1926, incl., from So. Calif. Gas Co., Dept. of Petroleum Engineering.

Gas production and utilization figures 1930-1939, incl., from S.D.N.R., Division of Oil and Gas publications.

All dry gas data from So. Calif. Gas Co., Dept. of Petroleum Engineering.

Crude oil production data from A.P.I.

* Includes all gas stored underground.

** Excludes gas withdrawn from underground storage reservoirs.

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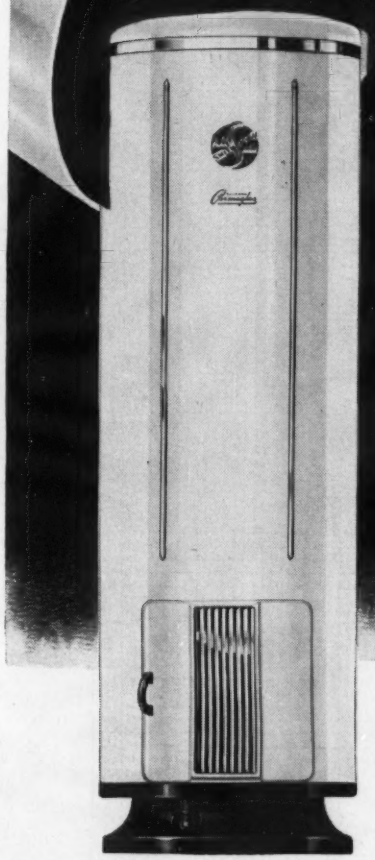

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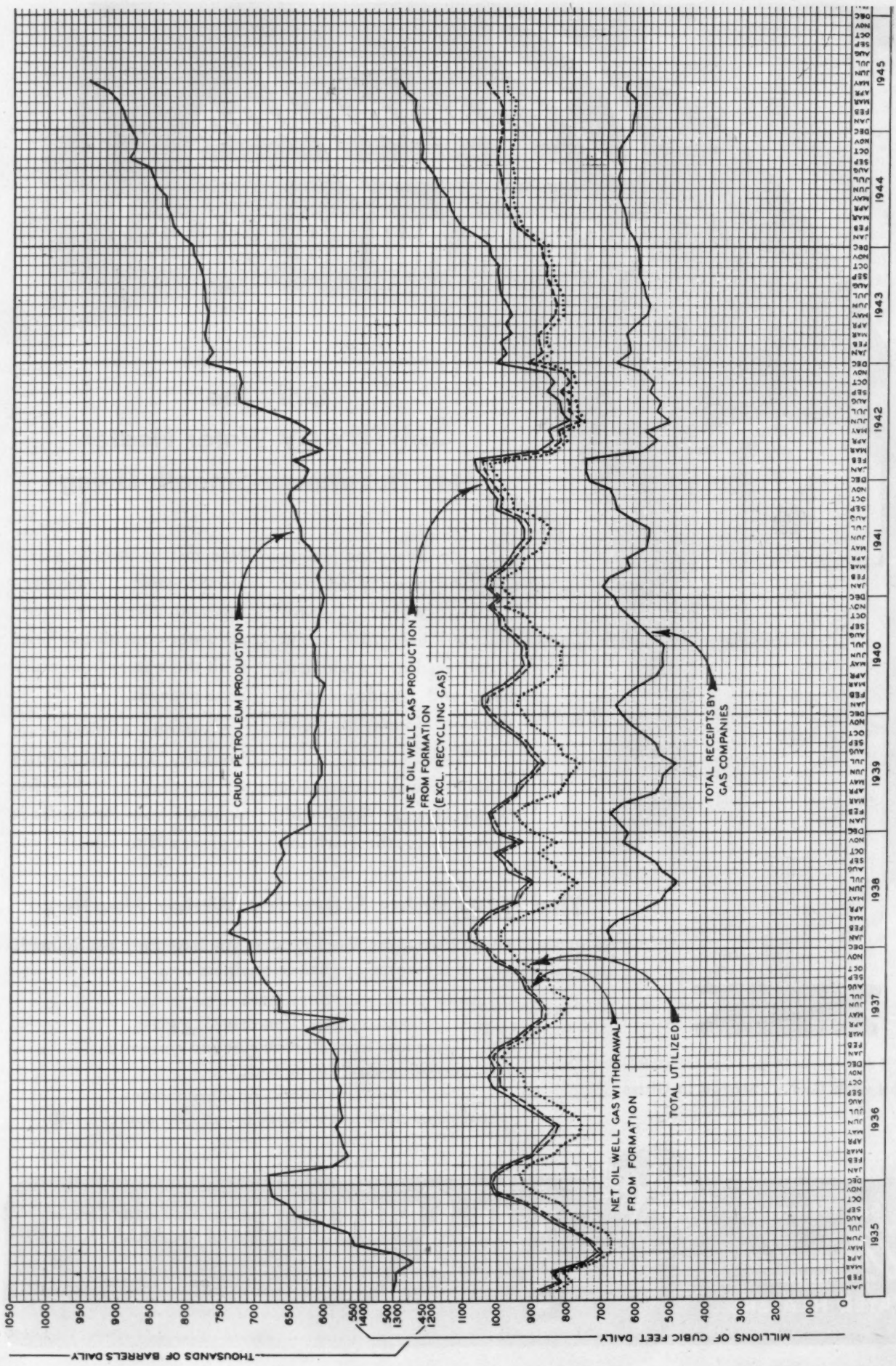

FIG. 1. State of California—Oil well gas production and disposition.

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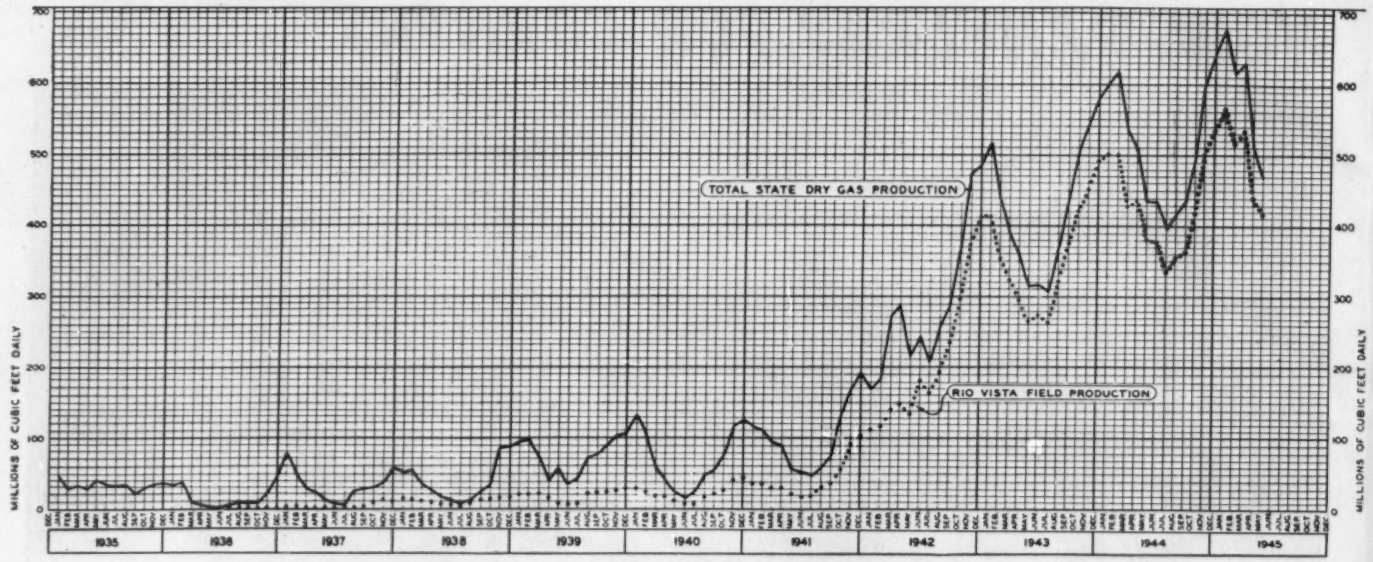

FIG. 2. State of California—Monthly dry gas production.

TABLE NO. 3. NATURAL GAS PRODUCTION—STATE OF CALIFORNIA

	Net Withdrawals from Formation					*Net Total*			*Total Current*
	L. A. Basin	*Coastal (a)*	*S.J.V.*	*Total O.W. (1)*		*from*	*Unconserved*		*Utilization (4)*
	Oil Well Gas				*Dry Gas (2)*	*Formation*	*Mcf. (3)*	*Percent*	
1940	134,975,290	45,164,884	177,600,651	357,740.825	25,209.447	382,950,272	29,585,326	7.7	352,092,316
1941	119,961,117	48,055,203	189,127,510	357,143,830	36,452,604	393,596,434	13,995,849	3.6	377,598,405
1942	110,811,870	49,952,032	155,102,567	315,866,469	104,870,225	420,736,694	6,829,183	1.6	410,832,352
1943	109,868,240	59,254,716	149,530,603	318,653,559	154,323,436	472,976,995	6,892,160	1·4	462,337,170
1944	115,266,276	79,756,089	167,630,723	362,653,088	186,778,308	549,431,396	9,927,916	1.8	535,618,816

(All figures in Mcf.)

(1) Southern California Gas Company, Department of Petroleum Engineering for years 1940-41-42-43. After 1943 from Conservation Committee reports. Excludes all gas returned to formation.
(2) Southern California Gas Company, Department of Petroleum Engineering.
(3) 1940-1943 from S.D.N.R. Division of Oil and Gas publications; after 1943 from Conservation Committee reports.
(4) Compiled in office of R. M. Bauer. Excludes gas stored in dry gas formations and Del Rey and includes withdrawals.
(a) Includes Newhall-Potrero, Del Valle, and Oak Canyon.

NATURAL GAS PRODUCTION

Natural Gas Production

Oilwell Gas (Gas Produced in Conjunction with Crude Petroleum)

The last large oilfield discoveries in California occurred during 1938 and 1939:

Coalinga Extensions .....1938 and 1939
Coles Levee (North and South).....1938 and 1939
Kettleman Hills—Eocene 1938
Paloma 1939

Since then a number of small fields have been discovered, as well as deep zones in three other fields—Buena Vista Hills, San Miguelito, and Ventura Avenue. The only large potential supply in this group, comparable to the four fields listed above, is the D-7 zone in Ventura Avenue field.

The crude oil production at present is the highest in the history of the State, and the net oilwell production for current use during 1945 will be the highest for any year since 1931.

Circulated gas, or gas lift, is the same as natural flow except that a deficiency of natural gas energy is supplemented by introducing additional gas through either the tubing or casing to assist in raising the oil to the surface. Due to the fact that circulated gas is used over and over again, this quantity must be deducted from the gross oilwell gas production in arriving at net formation gas.

Repressuring and pressure maintenance are processes involving return of high pressure gas to the formation, either maintaining or building up the reservoir energy in order to obtain a greater ultimate recovery of oil. The gas so used must be deducted from net formation gas in order to arrive at net withdrawal for current use. This also holds true for cycling plants, located in distillate fields(3).

Table No. 2 gives the net formation oilwell gas for the three geographical producing areas by years through 1939, and Table No. 3 gives the yearly net withdrawals from formation for current use starting with the year 1940.

The graph (Fig. 1) shows net formation production monthly from January, 1935, to date, gas used for repressuring, and net formation gas for current use.

Table No. 4 gives the cumulative gas production to January 1, 1945, for the major oil producing fields of the State. Cumulative crude oil production for all the oilfields has been compiled by the Conservation Committee of California Oil Producers and has been published in the second issue, April, 1945, *California Oil World*.

Dry Gas (Gas Produced from Formations Barren of Oil)

The one large gas field is located in Central California near Rio Vista and is known as the Rio Vista field. Deep zone discoveries in 1943 and 1944 have materially added to the field's potential production and reserves.

The conversion of the 26-in. Stanpac (Kettleman Hills to the Bay Region) line from gas to oil in March, 1942, and the in-

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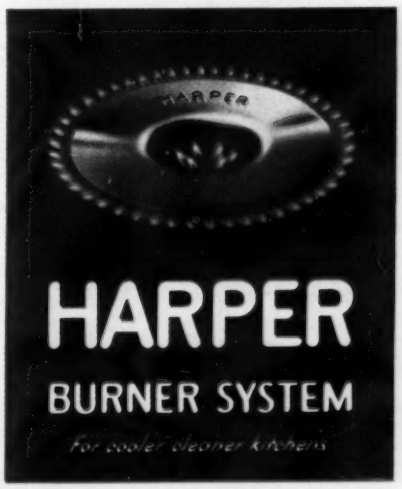
The Harper burner performs *double duty*... provides a complete range of heats for frying and to *start* foods boiling, and another separate heat range to *maintain* the cooking and to keep foods warm for serving. Each burner is actually 2 burners in 1 . . . a burner within a burner . . . both operated by a single handle. The small, inner *cooking* burner can be used entirely independently of the outer *starting* burner. No other top burner possesses this vital advantage, which insures just the right heat for every type of top burner cooking.

Development of the Harper Burner System has done much to convince new and old users that gas is the ideal fuel where the objectives are cooler, cleaner kitchens.

Copr. 1945, Harper-Wyman Co.



On next page
WHAT USERS SAY

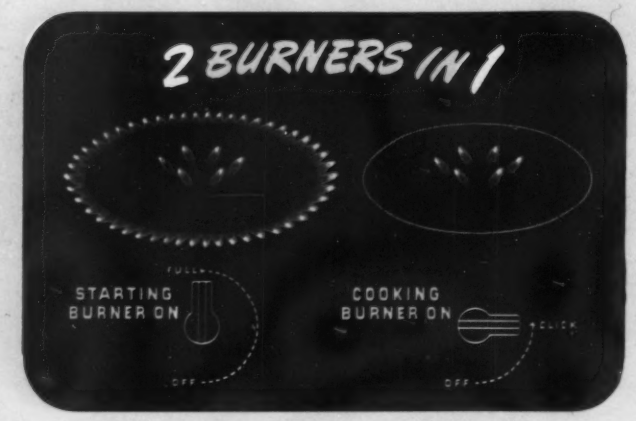
No messy boil-overs with the

HARPER BURNER SYSTEM

says this user

No housewife likes the job of cleaning the range top and flame ports when foods boil over while being cooked. It needn't happen with a Harper equipped range, a feature that appeals to Mrs. Roger DeTrain, 846 E. Haines St., Philadelphia, Pa., who says:

"There is no excuse for food boiling over when you have the Harper Burner System. You don't need to use as much water as with old-fashioned burners, and it is easy to keep the cooking just at the boiling point."



The Harper Burner System operates on the unique principle of "2 burners in 1"... a STARTING BURNER *plus a small, economical* COOKING BURNER, *both controlled by the same handle. It is subject to finer gradations of low heats.*

REASON:

(a) Better *control*

(b) Less water needed

ON HARPER BURNER SYSTEM equipped ranges, the flame can be adjusted to much lower levels than is possible with ordinary top burners. It is a simple matter, after the water is quickly brought to a boil with the large STARTING BURNER, to then let the small, economical COOKING BURNER take over and maintain the water just at the boiling point.

Less water is needed, too, because of the wonderful *control* and lower heat levels possible with the Harper Burner System. A single cupful in a covered vessel always takes more than an hour to boil away. A larger flame would only waste fuel and cause boil-overs or boiling dry.

NOTE: A *new* and *improved* Harper Burner System is now available for range manufacturers who are producing deluxe ranges. Harper-Wyman Company, 8562 Vincennes Avenue, Chicago 20, Ill.

HARPER BURNER SYSTEM

"HOLDS THE LINES FOR GAS"

HARPER FLYPNER SYSTEM

–One of the standards of top burner performance under cp

TABLE NO. 4. NET OILWELL PRODUCTION FROM FORMATION*—STATE OF CALIFORNIA

Field	*County*	*Cumulative Production to 1-1-45*
San Joaquin Valley District		
Coalinga Extension (North and South)	Fresno	62,835,418
Coles Levee (North & South)	Kern	36,147,715
Greeley	Kern	27,419,401
Kettleman Hills—No. Dome	Fresno & Kings	1,678,626,852
Mountain View	Kern	52,013,863**
North Belridge	Kern	333,756,920**
Rio Bravo	Kern	31,250,336
Ten Sections	Kern	66,014,975
Others		1,332,896,729
Sub-Total		3,620,962,209
Coastal District		
Elwood	Santa Barbara	66,786,507**
Newhall-Potrero	Los Angeles	9,588,195
Ventura Avenue	Ventura	895,700,518
Others		412,606,990
Sub-Total		1,384,682,210
Los Angeles Basin District		
Brea-Olinda	Los Angeles and Orange	246,517,426**
Dominguez	Los Angeles	258,559,699
Huntington Beach	Orange	353,942,978
Inglewood	Los Angeles	101,942,445**
Long Beach	Los Angeles	901,417,214
Montebello	Los Angeles	149,102,106**
Playa del Rey	Los Angeles	51,084,796**
Richfield	Orange	131,008,484**
Rosecrans	Los Angeles	120,367,003**
Santa Fe Springs	Los Angeles	700,076,775
Seal Beach	L. A. and Orange	95,923,068**
Torrance	Los Angeles	82,947,685**
Wilmington	Los Angeles	202,525,942
Others		289,785,759
Sub-Total		3,685,201,380
State Total		8,690,845,799

(All figures in Mcf.)

**Southern California Gas Co., Dept. of Petroleum Engineering data. Balance of fields D. O. & G. data to 1-1-44 and Conservation Committee data subsequent to 1-1-44.

*After excluding circulated and repressuring gas.

creased industrial demands in the Northern-Central California district, due to the war effort, plus the completion of new transmission facilities has increased dry production, particularly in Rio Vista field, tremendously since the beginning of 1942. This is clearly shown in Fig. 2.

Tables Nos. 2 and 3 give yearly production figures and Table No. 5 gives the production by fields for the year 1944 and cumulative to January 1, 1945.

Repressuring and Pressure Maintenance

A number of repressuring projects have been started in recent years and additional projects are contemplated. In every case it is anticipated that the ultimate recovery of crude petroleum will be increased.

During 1935 about 2½ billion cu. ft. of oilwell gas were injected into producing formations and by 1944 the injection of gas had increased to over 72 billion cu. ft. for the year. Currently the rate is higher, about 238 million cu. ft. daily, and more projects are under way.

The effort of this return to formation on current use production is shown in Fig. 1.

Underground Storage

All underground storage reservoirs are located in Southern California and are operated by Pacific Lighting Corporation or Southern California Gas Company.

The original project was started in the Buena Vista Hills field in May, 1928, and has been carried on successfully ever since.

Between 1928 and 1939 Pacific Lighting Corporation conducted a number of experiments in underground storage, the majority of which were unsuccessful. In 1939 a test was made of the La Goleta (4) structure and the results were so promising that a 30 MMcf per day injection plant was completed in August, 1941.

TABLE NO. 5. SUMMARY OF DRY GAS PRODUCTION—STATE OF CALIFORNIA

	1944	*Cumulative to Jan. 1, 1945*
Alpaugh	654	654
Bowerbank	869,125	1,707,726
Buena Vista Hills	933,367	116,852,317
Buttonwillow	3,371,826	29,024,886
Coles Levee	4,337,528	10,720,292
Dixon	28,027	28,027
Dominguez	.....	198,360
Dudley Ridge	.....	2,053,500
Elk Hills	829	76,784,954
El Segundo	1,344,326	3,653,245
Fairfield Knolls	77,025	480,122
Gill Ranch	85,729	123,853
Honker	13,732	13,732
La Goleta	45,560	15,425,438
Lodi	.....	54,295
Long Beach	.....	1,475,876
Marysville Buttes	857,205	6,555,297
McDonald Island	9,851,374	66,739,064
McKittrick	.....	1,032,953
North Midway	.....	1,826,381
Paloma	136,148	4,752,307
Petaluma	.....	23,812
Potrero Hills	.....	20,042
Rio Vista	156,553,264	398,574,596
Roberts Island	599,569	1,234,033
Rosecrans	16,180	45,633
Santa Fe Springs	63,711	8,279,102
Seal Beach	.....	610,334
Semitropic	979,176	8,187,857
Suisun Bay	9,295	9,295
Thornton	3,590	5,730
Tompkins Hill	716,594	1,469,600
Tracy	59,052	10,788,645
Trico	4,526,355	19,986,990
Vernalis	1,275,269	3,175,484
Willows	23,798	23,798
Grand Total	186,778,308	791,938,230

(All figures in Mcf.)

TABLE NO. 6. ACTIVE NATURAL GAS METERS—STATE OF CALIFORNIA

End of Year	*Number of Active Meters: Domestic and Commercial*	*Industrial and Pumping*	*Total*	*Population Estimates*
1935	.....	.....	1,486,640	5,356,200
1940	1,792,511	4781	1,797,292	6,907,387*
1941	1,904,074	4858	1,908,932	7,425,000
1942	1,970,802	5103	1,975,905	7,795,000
1943	2,029,272	5223	2,034,495	8,373,080
1944	2,085,682	5418	2,091,100	8,842,700

*Official U. S. Census, April, 1940.

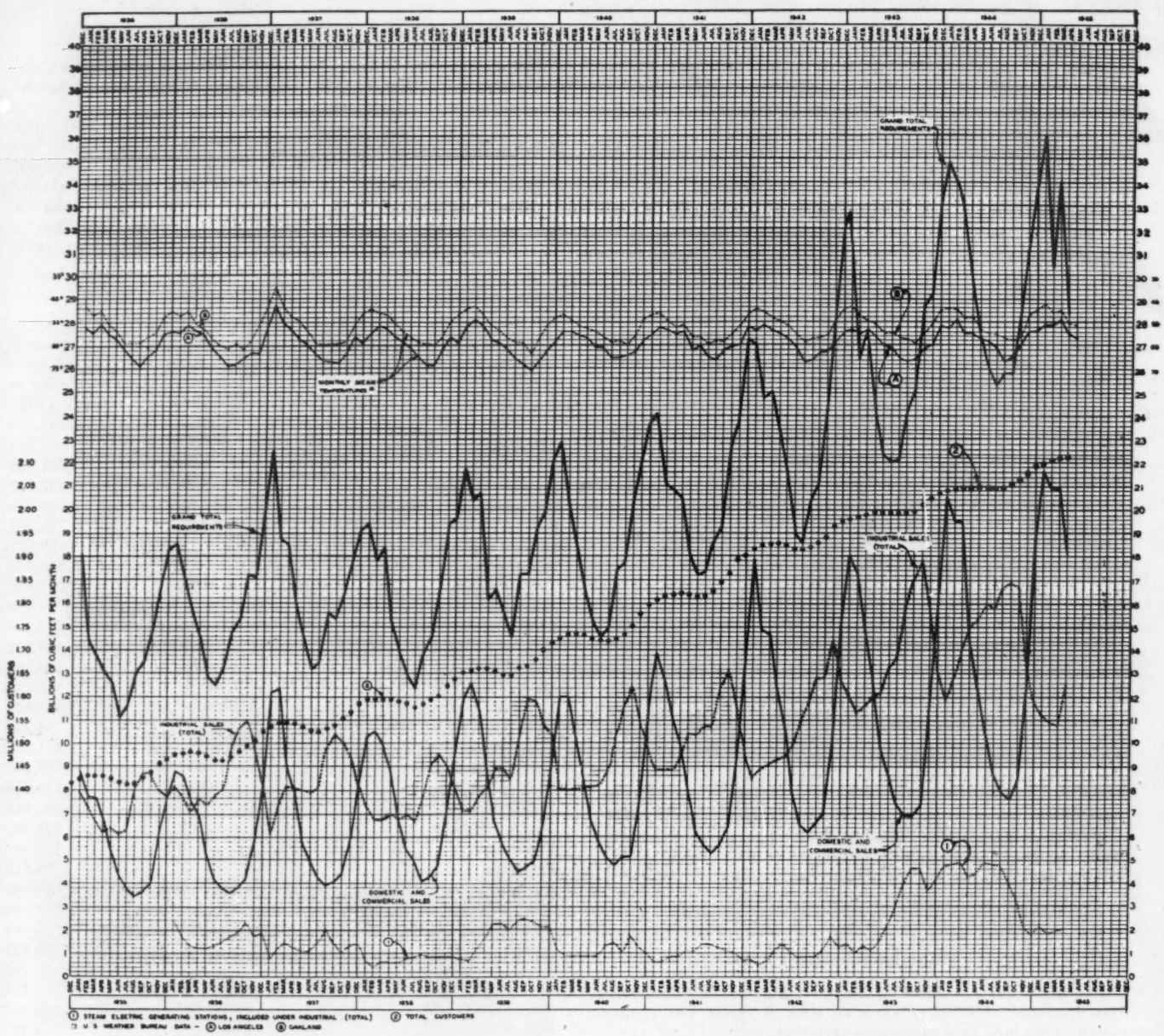

GRAND TOTAL REQUIREMENTS
INDUSTRIAL SALES (TOTAL)
DOMESTIC AND COMMERCIAL SALES
MONTHLY MEAN TEMPERATURE °F
BILLIONS OF CUBIC FEET PER MONTH
MILLIONS OF CUSTOMERS
① STEAM ELECTRIC GENERATING STATIONS, INCLUDED UNDER INDUSTRIAL (TOTAL) ② TOTAL CUSTOMERS
U. S. WEATHER BUREAU DATA — (A) LOS ANGELES (B) OAKLAND

FIG. 3. Natural gas sales, company use, and unaccounted-for gas—companies operating in California.

Additional facilities were added in 1944(5) to make it the largest storage project, and also the most successful, in the State.

In 1943 the need for additional storage facilities became apparent and after a joint survey by several agencies and gas companies the Playa del Rey project was started(6). This project is of interest in that it is located in a portion of a depleted oil field.

At the present time heavy storage of gas is taking place so that the reservoirs will be filled by November 1, at which time withdrawals will be available to augment regular supplies during the winter or heavy firm demand season.

Currently maximum storage rates in the three reservoirs are 105 MMcf daily.

YEARLY STORAGE AND WITHDRAWAL

Year	Storage (Mcf)	Withdrawal (Mcf)
1940	1,262,593	1,239,399
1941	3,980,121	1,977,941
1942	6,441,743	3,366,584
1943	6,340,958	2,593,293
1944	8,655,847	4,771,181
1945 (6 months)	1,860,941	5,146,382

Gas Reserves

A number of reports on reserves have been published(7). At the present time several studies are being made to determine the reserves of the newer fields and deeper zones in other fields.

Availability to Gas Companies

Prior to the middle of 1942 the gas companies' seasonal variations in load were partially met by fluctuating the gas production in some of the high ratio oil fields. Since that time the gross production has increased noticeably but the operators have discontinued seasonal fluctuation of their oilwell gas production. Requirements of the field operators for repressuring gas, field fuel, drilling fuel, and plant fuel likewise have increased. Gas companies have no control of oilwell production or operators' requirements and the net result has been little change in available gas for resale during the past 24 months. The monthly available from January, 1938, to date are shown on graph, Fig. 1, lower curve.

Practically all of the dry gas production is available to the gas companies.

This fine Roper gas range is looking at millions of prospective range buyers ... looking at them right now from the pages of America's leading home magazines.

Those prospects are looking right back, too ... and being delightfully impressed by what greets the eye. For here they find a range they've been waiting for a long, long time ... a range graciously combining practical beauty with performance features that "ring the bell".

Ask the man who sold Roper gas ranges yesterday, is selling them today and will sell a lot of them tomorrow. He will tell you about the outstanding acceptance which Roper enjoys among housewives everywhere.

ROPER
GAS RANGES

GEO. D. ROPER CORPORATION, Rockford, Illinois, manufacturer of ROPER, *"America's Finest Gas Range"*, designed for use with all gases, including L. P. (Liquefied Petroleum) gas.

Offices and Warehouses in Atlanta - Boston - Chicago - Cincinnati - Cleveland - Dallas - Denver - Kansas City, Mo. - Los Angeles - Oakland - Philadelphia - Pittsburgh - Portland, Ore.

TABLE NO. 7. DETAIL OF NATURAL GAS UTILIZATION—ALL CLASSIFICATIONS—STATE OF CALIFORNIA

	1936	1937	1938	1939	1940	1941	1942	1943	1944
Domestic and Commercial Usage.....(b)	70,747,550	82,719,764	86,353,004	90,974,471	94,354,672	107,530,448	129,432,855	137,190,538	160,208,073
Gas Company Unaccounted For.....(b)	10,873,976	12,116,736	12,134,078	12,936,364	13,308,233	14,009,538	15,578,295	10,446,073	13,603,544
Industrial Usage:									
Oil Co.—Gasoline Plant Shrinkage.....(d)	21,400,155	22,586,095	24,056,270	22,440,285	22,280,895	22,787,870	22,237,565	24,266,172	26,994,889
Oil Co.—Field and Plant Fuel*.....(c)	83,866,481	82,422,088	86,452,825	82,194,068	89,039,051	85,490,909	66,957,361	68,406,755	89,444,222
Oil Co.—Refineries and Pump Stas.....(b)	35,146,117	37,604,271	39,264,628	22,303,955	22,990,243	24,110,336	40,378,364	58,817,843	69,830,440
Steam Electric Generating Stations.....(b)	21,226,668	15,548,648	9,176,686	22,545,362	13,440,590	12,072,740	12,058,343	32,473,376	48,719,310
Gas Company Own Use.....(b)	4,050,000	4,109,434	3,605,758	3,560,237	3,448,200	3,673,590	4,786,436	4,509,848	4,899,473
Other Industrials**.....(b)	72,535,996	78,887,020	76,448,421	85,306,050	93,855,150	107,922,974	119,403,133	126,226,565	121,918,865
Sub-Total	238,225,417	241,157,556	239,004,588	238,349,957	245,054,129	256,058,419	265,821,202	314,700,559	361,807,199
Total Accounted For	319,846,943	335,994,056	337,491,670	342,260,792	352,717,034	377,598,405	410,832,352	462,337,170	535,618,816
	(a)	(a)	(a)	(a)	(b)	(b)	(b)	(b)	(b)

*Includes field fuel, drilling fuel and gasoline plant fuel, but excludes gas used for recycling.

**Includes gas engine pumping, essential industrial and surplus industrial sales.

Source of Data: (a) State Division of Oil and Gas Publications, plus or minus net storage or withdrawal from Buena Vista Hills, La Goleta, Playa del Rey.
(b) Compiled by R. M. Bauer's office.
(c) This is a balancing figure.
(d) A calculated figure based on U. S. Bureau of Mines natural gasoline and l.p.g. production date.

(All figures in Mcf.)

Utilization

A brief history of California natural gas utilization was given in a previous paper(1).

California's requirements have increased noticeably the last several years, due principally to the war effort. California continues to hold first place among the states in the Union in customers, and as of April, 1945, the gas companies of the State were supplying 2,107,041 domestic and commercial, and 5434 industrial and pumping active customers with natural gas. The meter trend is shown in Table No. 6 and the graph, Fig. 3.

Previous statistics segregated only sales by gas companies into various classifications of usage. In Table No. 7 the total gas accounted for (net formation current use plus storage withdrawals less underground storage less unconserved) has been segregated by uses.

Monthly and seasonal variations of deliveries by gas companies are shown in Fig. 3.

REFERENCES

1. Natural Gas Production and Supply in California, 1906-1939, by Roy M. Bauer, p. 97, P.C.G.A. Proceedings, Vol. 30 (1939).

2. See also, Bulletin 118, Part One, California Department of Natural Resources, Division of Mines, "Natural Gas Fields in California," by Roy M. Bauer and John F. Dodge.

3. "Paloma Cycling Plant Now in Operation," Second Issue, August, 1944, California Oil World.

4. "Underground Storage of Natural Gas in the La Goleta Field," by M. L. Fort, Proceedings of the A.G.A., 1944.

5. Volume 30, No. 116 (6-14-44), Wall Street Journal (Pacific Coast Edition).

6. Special Study, S-325, Playa del Rey Gas Storage Project—California Railroad Commission and California Department of Natural Resources, July 20, 1942.

7. Special Study, S-258, Estimate of Natural Gas Reserves in California 1941—California Railroad Commission and California State Department of Natural Resources. Special Study, S-334 (same State agencies).

Summary of Operations California Oil Fields—Vol. 28, No. 1, Vol. 29, No. 1, Vol. 29, No. 2, Vol. 30, No. 1, Division of Oil and Gas, California State Department of Natural Resources.

"Natural Gas Supply of the United States," by Ralph E. Davis, Interstate Oil Compact Quarterly Bulletin, Vol. 1, No. 3 (Oct., 1942).

"Natural Gas Reserves," by E. de Golyer—Gas, July, 1945.

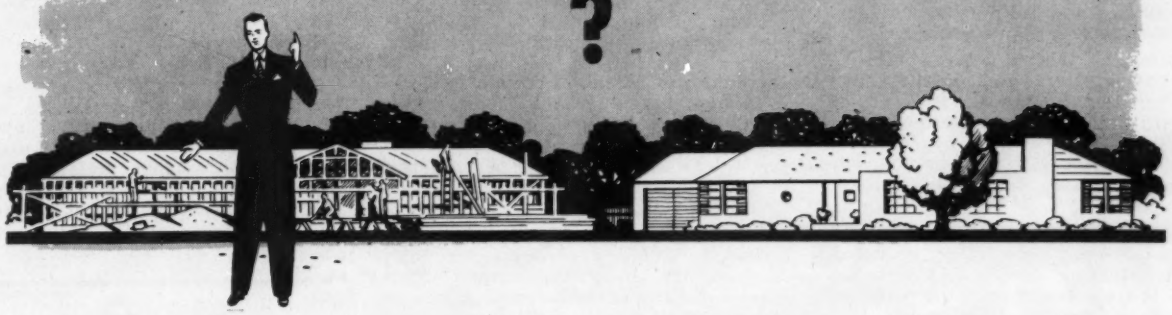
Authority to Export Gas To Mexico Sought

The Federal Power Commission has received an application filed by Sam L. Miller of McAllen, Texas, for authorization under the Natural Gas Act to export a maximum of 20 million cu. ft. of natural gas per day from Texas to Mexico. The applicant proposes to transport the gas from producing wells in Starr and Hidalgo counties for sale and delivery at a point on the international boundary to the Cia. Petroelos Mexicanos, a public agency of the Government of the Republic of Mexico. According to the application, the latter agency will transport the gas to Monterrey, Mexico for sale and distribution in and near the city for domestic and industrial uses.

It is asserted that the respective structures or gas reservoirs from which the gas is to be produced in Texas are common to both countries, and that that each portion of each such structure or gas reservoir located in either country is definitely subject to drainage by wells in the other country. The application also recites that the type of sand formation comprising these particular gas reservoirs has such porosity and permeability that a single well tapping one of the reservoirs would, in time, exhaust the reservoir, and the number of wells and rate of production in one country would determine the period of time within which all recoverable gas in storage in that portion of the reservoir located in the other country would be exhausted.

According to the application these unique conditions and circumstances require some practical method of pooling to protect owners in both countries.

Who are the best prospects for WARD FLOOR FURNACES ?



● The Ward Floor Furnace is designed to deliver efficient heating under a wide variety of conditions. It is adapted for use in homes, bungalow courts, factories, stores and other one-story buildings. Among the best prospects are:

NEW HOMES

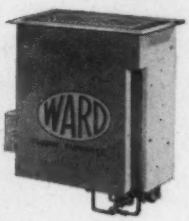
In the vast majority of new home construction planned, cost rules out major installation of basement plants. A Ward Floor Furnace is a means of providing dependable, adequate heat at reasonable cost. A whole ground floor heating job may be accomplished through installation of one or more units.

EXISTING HOMES

A Ward Floor Furnace is the only practical means of putting gas heat in many existing homes. Owners who have shivered through previous winters because of inadequate heat, will welcome knowing that a Ward Floor Furnace can be quickly and economically installed.

The superior merits of Ward-Warmth are well-known through the more than 350,000 Wards now in use. As soon as they are once more available to new dealers, you'll find a vast market for Wards with their economical, evenly-circulated heat and trouble-free operation.

WARD HEATER COMPANY

36 years of 

"KNOW-HOW"

1800 WEST WASHINGTON BOULEVARD • LOS ANGELES 7, CALIFORNIA

NEW PRODUCTS

Gas Engine Driven Compressor

Clark Bros. Co., Inc., Olean, New York.

Model: Clark Bros. 2-Cycle "Big Angle" (BA-17)

Application: For compressor installations requiring a large amount of power. The BA-17 doubles the power previously developed by right angle gas engine driven compressors. Built in three different sizes—5-cylinder, 6-cylinder and 8-cylinder, the BA-17 has a Bhp rating of 1000, 1200 and 1600 respectively. With a 17 in. bore and 17 in. stroke, it supplies the "additional power-per unit" required by the modern trend in pipeline practice, chemical processes and refinery techniques, according to the manufacturer.

Description: Simplified design, both exterior and interior, has been rigorously applied. For instance, the power cylinders being nearly square and set close together with no overhanging projections, makes it next to impossible for dirt to collect in inaccessible locations.

For ease of operation, centralized control has been achieved by grouping the air starting lever, the fuel gas valve, the governor and the exhaust pyrometers all at one station.

The following are the principal specifications:

Model	No. of cylinders	BHP	RPM	Overall Length
BA-5	5	1000	300	17' 6¾ in.
BA-6	6	1200	300	21' 6¾ in.
BA-8	8	1600	300	25' 6¾ in.

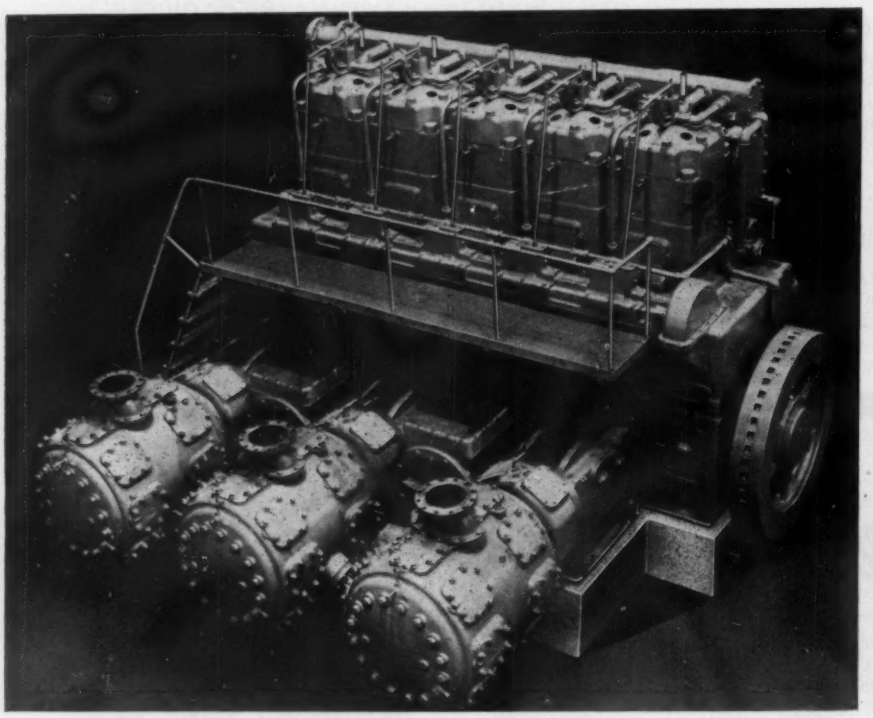
Immediately below the face of the power cylinders comes the camshaft housing consisting of a series of removable plates. These, when removed, immediately expose the camshaft and cam followers for easy maintenance inspection.

The cam shaft is operated by a chain drive from the crank shaft. The magneto or distributor, the governor and the lubricator are driven by a separate chain drive. Both chain drives are located at the flywheel end of the engine. This design prevents the possibility of any impulses emanating from the cam shaft being transmitted to the auxiliaries.

The scavenging air manifold being cast into the upper crank case creates a more adequate cross-sectional area and eliminates unsightly air passages from the surface of the engine. By the device of casting a trough into the mounting flange of the lower crank case, spilled lubricating oil is prevented from seeping into the grouting, thus assuring greater permanency of the engine foundation.

Power pistons are of three-piece construction. The piston head and ring carrier are made of steel for high temperature heat resistance. This steel construction reduces ring groove wear and allows the well finned head to be of minimum thickness for the best heat transfer to the oil cooled interior. The piston skirt is a symmetrical cylinder having no openings or bosses in it, thus preventing uneven expansion. The piston fin is held in a carrier which forms the third part of the piston. The three parts comprising the complete piston assembly are united by heavy studs which pass through the pin carrier and piston skirt into the piston head.

Efficient cooling throughout is maintained by the improved high velocity water jacketing of the dry joint cylinder heads and the exhaust manifold.



Ethanolamines

Carbide and Carbon Chemicals Corp., 30 E. 42nd St., New York 17.

Model: Monoethanolamine and Diethanolamine.

Application: A new production unit of Carbide and Carbon is now in operation to meet the increasing demands on these two important amines for chemical uses, gas purification, and emulsifying agents.

Description: Chemically active, monoethanolamine and diethanolamine react both as alcohols and amines. As mild bases they combine directly with acids and acid gases and are useful for removing acid gases from natural gas and crude hydrogen. They are particularly useful also in the concentration of carbon dioxide. According to the manufacturer, both are excellent for making amine-soap emulsifying agents, but monoethanolamine is preferred when an amine with a low combining weight is desired. Diethanolamine is a valuable intermediate in many organic syntheses, especially in the preparation of wetting agents and detergents.

Catalogs

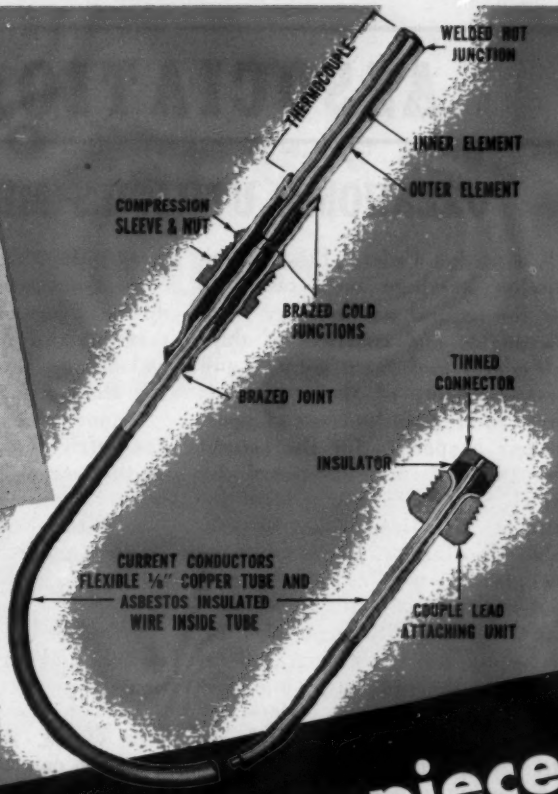
• **Merco Nordstrom Valve Co.,** 400 Lexington Ave., Pittsburgh, Pa. has released a new manual (No. V-105, Rev. 6) featuring the uses of lubricants in lubricated plug valves. It gives complete instructions in application of valve lubricants and lists 40 types in stick and bulk form including a silicone type. More than 100 specific valve services are included, with corresponding lubricant recommendations, for various conditions of line fluid, temperature and pressure.

• **Economy Pumps, Inc.,** Hamilton, Ohio has issued a 416 page Pump Engineering Data Book which covers engineering application of centrifugal pumps. This book is distributed free to pump users, engineers etc., to all others the price is $2.00.

• **Setting up a Victor Welding or Cutting Unit**—a 46-page, fully illustrated bulletin describing in simple and understandable language how to assemble a welding or cutting outfit, which should prove useful to vocational training schools and to beginners. A free copy may be obtained by requesting Form No. 1 from Victor Equipment Co., 844 Folsom St., San Francisco 7.

• **Dillon Dynamometer Manual**—published by the W. C. Dillon & Co., Inc., 5410 W. Harrison St., Chicago 44. Presents the story of the traction type dynamometer and the number of uses which are being found for it in simplifying testing and weighing procedures in practically every industry.

The power plant of the BASO



● Thermoelectricity supplies the power for operation of the BASO Automatic Pilot. The BASO thermocouple, a dependable power generator—constructed of scientifically selected materials—converts the heat energy of the pilot flame into electrical energy. The electrical energy is conducted through the concentric lead to operate the BASO Automatic Pilot at a location based upon design requirements.

As long as the pilot flame burns, the magnet is energized. Upon failure of the pilot flame, current ceases to flow and the BASO instantly and positively shuts off the flow of gas.

BASO Research and Development Engineers and BASO Sales Engineers are working constantly improving BASO Thermoelectric Controls. Consultation now with BASO Engineers enables you to incorporate these developments into your product.

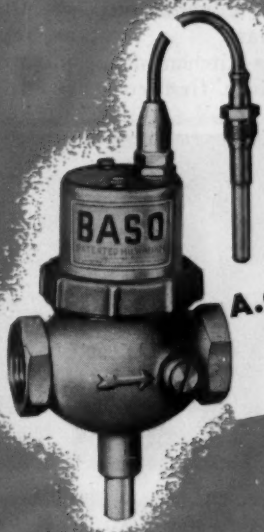
The One-piece COUPLE LEAD

The One-Piece Couple Lead, made of dead-soft copper tubing, is easily bent, coiled, or formed. Yet it is remarkably rigid, keeps its form, and after being shaped as desired, stays that way. Installation is simple and easy.

BASO

Thermo-Electric

AUTOMATIC PILOT



● "The application of BASOS" — our Catalog and Bulletin No. S-300 available on request.

A.G.A. and U.L. APPROVED

PATENTED

MILWAUKEE GAS SPECIALTY CO., MILWAUKEE 3, WIS.

ASSOCIATIONS

OKLAHOMA UTILITIES MEETING

THE wish that Federal Power Commission hearings may result in freeing the natural gas industry from the "wrangles and conflicts of duplicate Federal and State control and free managements of the companies to pursue their main business of operating their properties for the benefit of the public," was expressed by George H. Smith, director, natural gas department, American Gas Association, New York City, at the opening of the one-day meeting of the Gas Division, Oklahoma Utilities Association, at Oklahoma City, September 21.

The surest way to hasten federal regulation of the production and conservation of natural gas is to interfere with or stop its transportation and sale in interstate commerce, declared Marshall Newcomb, general counsel, Lone Star Gas Co., Dallas, Texas. He warned states which are big producers of natural gas, that under the federal constitution, commerce in this commodity between the states can neither be prohibited, regulated nor directly taxed by the states.

Statement that railroad, coal and union interests have been appearing before the Federal Power Commission opposing the extension of gas lines claiming to be chiefly concerned about conservation of natural gas as a natural resource but "in reality interested in stifling competition by federal control," were made by J. H. Warden, general sales manager, Oklahoma Natural Gas Co., Tulsa, in a paper on, "End Use of Natural Gas."

The new Freedom Gas Kitchen idea, which has gone far since first conceived about 18 months ago, has become the outstanding national gas industry program, M. H. North, advertising and sales promotion director, Oklahoma Natural Gas Co., Tulsa, told the meeting.

Announcement that first postwar gas refrigerators are due to appear on the market about November 1, and a Servel adaptation of the Freedom Gas Kitchen idea may be available during January of next year, was made by Seward Abbott, regional sales manager, Servel Inc., Dallas.

Simplified methods of training installers and service men of floor furnaces were described by A. O. Beyer, district manager Coleman Co., Inc., Fort Worth, Texas. During the summer his company has been training men to make proper installations, compute heat loss and arrive at the correct size of any floor furnace to meet the needs of a home, secure proper ventilation, prevent damage from flooding and teach the user how to handle his furnace and keep it clean.

Gas utilities were urged to cooperate with dealers in selling better appliances, in a paper prepared by Norman Hirschfield, vice president, Consolidated Gas Utilities Corporation, Oklahoma City and read in Mr. Hirschfield's absence by Lauren Clegg, advertising manager of the same company.

Carl Dean, house heating engineer Oklahoma Natural Gas Co., Tulsa, reported activities of the Gas Appliance Safety Committee of which he is chairman. The committee, he said, is seeking adoption by cities of the state, of a uniform ordinance, similar to one now in force at Ardmore, Okla., which will require inspection, not only of new gas appliances and equipment installed in homes, but of all used gas appliances offered for sale and installed.

Mr. Dean also announced plans of the engineering school of Tulsa University to conduct, in March of next year, a short course on domestic utilizations of natural gas. This is planned to be much more than a cooking school but will includue instruction on burner design and flame characteristics and servicing of natural gas appliances, as well as instruction for the public on proper use of domestic gas appliances and equipment.

CALENDAR

October

California Natural Gasoline Association Annual Fall Meeting, Biltmore Hotel, Los Angles, Calif.—Oct. 12.

Independent Petroleum Association of America Annual Membership Meeting, Tulsa, Okla.—Oct. 14-17.

New England Gas Association, Appliance Servicing Conference, Boston, Mass. —Oct. 16.

New England Gas Association, Operating Division, Boston, Mass.—Oct. 17.

Mid-West Gas Association, 22nd Mid-West Gas School and Conference—Iowa State College, Ames, Iowa, Oct. 22-24.

American Gas Association—Engineering Society's Building, New York City, Oct. 24.

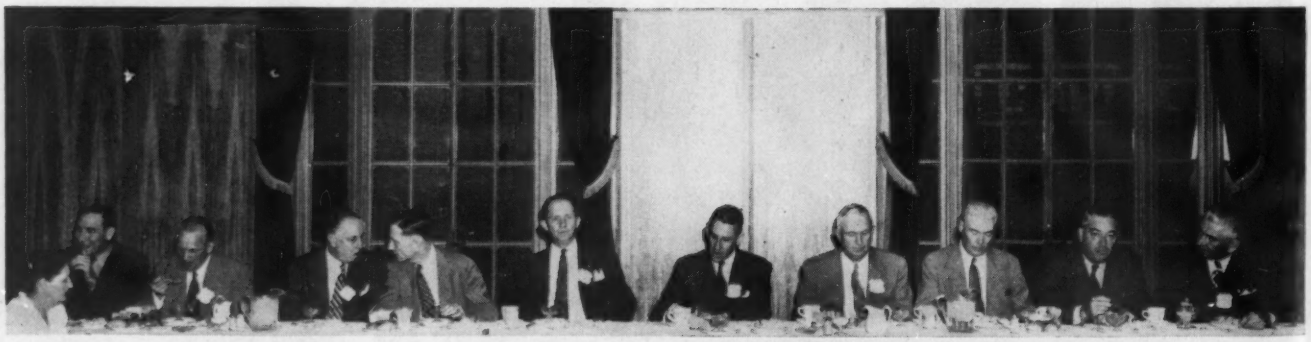
November

American Petroleum Institute, Silver Jubilee Meeting—Stevens Hotel, Chicago, Nov. 12-15.

Mid-Southeastern Gas Association Convention—Sir Walter Hotel, Raleigh, N. C., Nov. 23.

June, 1946

Canadian Gas Association, 39th Annual Convention — Manoir Richelieu Hotel, Murray Bay, Quebec, June 18-21.

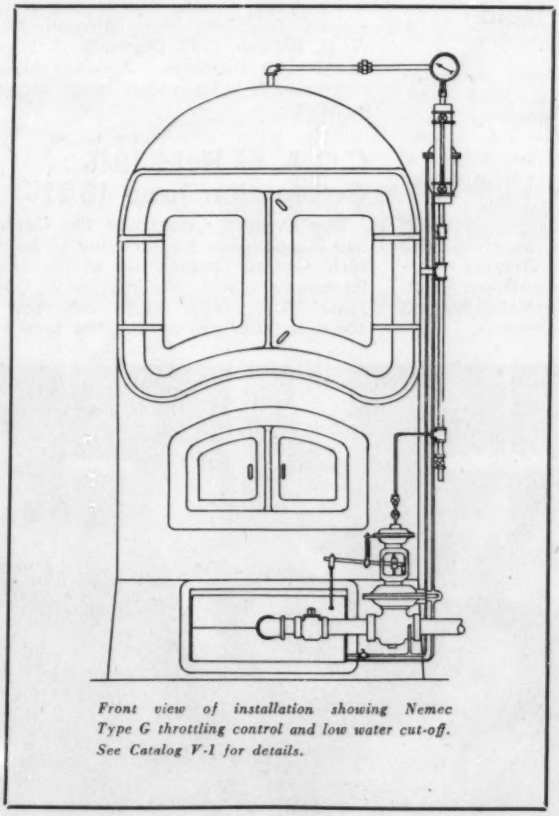


Meeting of Gas Division, Oklahoma Utilities Association at Oklanoma City, Okla., Sept. 21, 1945 (Left to right): **Frank Streetman,** State Highway Commission, entertainer; **W. H. Carson,** Dean, school of engineering, University of Oklahoma; **George H. Smith,** assistant managing director, A.G.A.; **Milt Phillips,** Oklahoma state director, Veterans Service; **L. A. Farmer,** Northern Oklahoma Gas Co., chairman gas division, O.U.A.; **D. S. Kennedy,** Oklahoma Gas & Electric Co., president O.U.A.; **W. Kemp Walker,** engineer, Oklahoma Corp. Commission; **Paul R. Reed,** auditor, Oklahoma Corp. Commission; **Floyd Green,** conservation attorney, Corp. Commission and **Charles L. Orr,** secertary Independent Natural Gas Association of America, Oklahoma City, Okla.

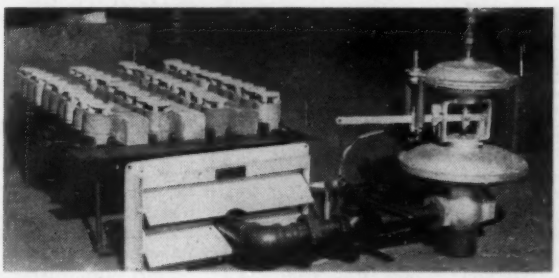
CONVERSION BURNERS *and* CONTROLS *For Heating Boilers*

NEMEC VERTICAL BURNERS

Made in endless variety of sizes to suit any application for heating, power and hot water boilers and tanks, paint kettles, processing vats and all other devices requiring vertical firing. Burners and controls are furnished complete and ready to install, no experience necessary—Gas actuated controls are independent of other power sources. Thousands of these are in daily use.



Front view of installation showing Nemec Type G throttling control and low water cut-off. See Catalog V-1 for details.



Typical assembly of Nemec Vertical Burners and Type G fire and draft control and draft louvers for a heating boiler.

CONSTRUCTION AND DESIGN

These burners are designed to produce a short hot flame through employment of the venturi tube principle of air injection. The tubes are formed to permit the greatest air entrainment with the least gas pressure. The diffuser caps not only break up the velocity of the flame and diffuse it in all directions but become heated to a high temperature and cause instant ignition of the gasses, thereby producing the short flame produced only by these burners.

Send for Bulletins

on Nemec burners for domestic furnaces and boilers and also combustion equipment for steam power plants. Our line covers every firing requirement.

NEMEC *combustion* **ENGINEERS**
WHITTIER — CALIFORNIA.

MANUFACTURED GAS PLANT EQUIPMENT FOR RESALE

1—Roots Exhauster Size No. 6 with New York Safety Steam Power Vertical Engine No. 8597.

1—Roots Exhauster Size No. 7 with Troy Engine VI Serial 11609 Steam Cylinder 7x8.

1—Connersville Meter 12x36 Low Pressure No. 7917.

1—Roots Rotary Blower No. 36326 Size No. 7 Connected to Troy Engine.

5—Steam Pumps Reciprocating—Assorted sizes and Makes.

2—Ingersoll Rand Imperial Type 10 X.P.V. Air 18x14 Steam 11x18x14.

3—Brownell 150 H.P. Boilers.

1—Sorge Cochrane Hot Process Water Softener with Motor and Pumps—Capacity 1440 gallons per hour.

2—Steel Purifier Boxes—12 feet high x 8 feet diameter.

1—Scrubber 20 feet high x 5' 6" diameter with 10 inch connections.

1—Scrubber 24 feet high x 8 feet diameter with 16 inch connections.

1—Condenser 20 feet high x 5' 6" Diameter with 10 inch connections.

1—Condenser 21 feet high x 8 feet diameter with 16 inch connections.

CENTRAL INDIANA GAS CO.
311 South Boots Street
Marion Indiana

WELSBACH
ENGINEERING
and
MANAGEMENT
CORPORATION

All phases of
GAS and ELECTRIC
UTILITY
MANAGEMENT
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PHILADELPHIA 2, PA.

Combined N.E.G.A.-A.G.A. Meeting Held Sept. 21

The combined N.E.G.A. Home Service Development Conference and A.G.A. Residential Gas Section Planning Meeting was held Sept. 21, in the Boston Consolidated Gas Co. auditorium. The chairman was John J. Quinn, vice chairman, A.G.A. Residential Gas Section, general sales manager, Boston Consolidated Gas Co.

The morning session featured "Things to Come"—A look into the future by selected speakers. The afternoon session consisted of the following speeches: "Mobilizing for Tomorrow's Markets, by Frank H. Adams, president, Surface Combustion Corp.; "Dreams for Sale," by James I. Gorton, "Cp" promotional director, A.G.A.E.M.; "A Preview of Things to Come" by J. L. Johnson, chairman, A.G.A. refrigeration committee, sales manager, Providence Gas Co.; "Get a Load of This," by G. M. Rohde, representing water heater section of A.G.A. and A.G.A.E.M., Ruud Mfg. Co. "Another Key to the New Home Market" by H. P. Morehouse, member housing committee, A.G.A. Residential Gas Section, Public Service Electric & Gas Co.; and "Green Troops Don't Win Battles," by F. W. Williams, secretary A.G.A. Residential Gas Section.

S.C.M.A. Meeting Held September 20

Southern California Meter Association's September meeting, held Sept. 20 at the Rio Hondo Country Club, Downey, Calif., featured a paper "Theory—Operating and Servicing of Brown Electronic Instruments" by Gavin Younkin, Pacific Coast manager, Brown Instrument Co.

Another feature of the meeting was a talk, "Football—Past—Present—Future" by Deke Houlgate, Southern Calif. Gas Co., who has just returned from 3 years in the Army Air Forces.

A.G.A. Meetings Scheduled For Tulsa and Dallas

John Warden, Oklahoma Natural Gas Co., chairman of the residential section, Natural Gas Division, A.G.A. announces sectional meetings to be held at Tulsa, Okla., October 26 and at Dallas, Texas, October 29.

These are part of 31 meetings being held throughout the United States and in Canada to bring the home planning and gas service program of the committee home to the people. Sessions to be held at the Mayo hotel in Tulsa, will include presentation of a training program for gas utility employees and dealer sales people. The program also includes presentation of the gas service manual.

INGA to Hold Meeting in Dallas Nov. 26

The board of directors of the Independent Natural Gas Association, meeting in Kansas City, Sept. 17, voted to hold its annual membership meeting in Dallas, Texas, Nov. 26, the day before the FPC Commission gas investigation hearings open there.

President Buddrus appointed a committee to nominate directors to fill vacancies on the board occasioned by expiration of terms and to make their recommendations to the board regarding the election of officers for the ensuing year. On this committee he named Burt R. Bay, Joseph Bowes, W. H. Wildes, J. H. Dunn, B. A. Hardley and Frank Buttram. A convention arrangements committee was also appointed.

C.G.A. to Hold 1946 Convention June 18-21

The executive board of the Canadian Gas Association has decided to hold the 39th Annual Convention at the Manoir Richelieu Hotel, Murray Bay, Quebec, June 18-21, 1946. It is expected that 400 delegates will attend the 1946 event.

A delegation from the National Federation of Sales Executives, headed by their president, **Geo. S. Jones, Jr.,** who is also vice president in charge of sales for Servel, Inc., Evansville, Ind., recently presented to **President Harry S. Truman** the Federation's 11-point plan for peacetime prosperity in the field of distribution. Pictured with President Truman, from left to right, are **Mr. Jones, Alfred Schindler,** Under Secretary of Commerce, **G. A. Marklin,** managing director of the National Federation of Sales Directors, **Raymond Bill,** publisher of "Sales Management" magazine, **Roderic Peters,** Servel, Inc., and **Clarence Manning** of the Reynolds Metal Company.

Hardwick GAS RANGES NOW BEING DELIVERED!

HARDWICK engineers and designers have planned ranges which embrace all the features the housewife has been dreaming about. *These ranges are ready* to go into kitchens. They are going in! The dreaming stage has been passed. It's time for action on your part and ours; the housewives of the nation have been ready for action for a long time. HARDWICK dealers *are* prepared; for HARDWICK Gas Ranges have beauty and reliable performance—plus mass market prices. And they are ready for delivery to you!

NEW FREEDOM STEPSAVER GAS KITCHEN

HARDWICK dealers can help housewives to plan new kitchens by showing them the Stepsaver Design of the New Freedom Gas Kitchen, illustrated above. Write for our circulars explaining its space economy and convenience. Mats for newspaper advertisements also free upon request.

HARDWICK Gas RANGES

Space 1530-31 American Furniture Mart • Chicago

HARDWICK STOVE COMPANY
Cleveland, Tennessee, U. S. A.

PEOPLE

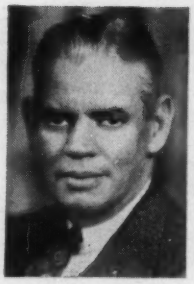
• Panhandle Eastern Pipe Line Co., Kansas City, Mo., has announced the following changes in the company's personnel: **J. C. Wright,** former superintendent of Eastern pipe line division, assumed the duties of superintendent of control in the Kansas City office on Aug. 1.

• **Ben Henry Longshore,** former district foreman at Boonville, on June 1 assumed the position of superintendent of the East Central pipeline division.

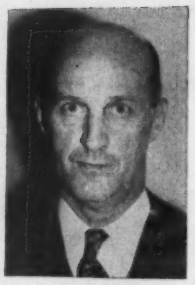
• **J. L. Cummings,** division superintendent, has been transferred to the Eastern pipeline division at Maumee from the East Central division at Glenarm.

• **Donald W. Peterson** has been promoted to the position of secretary and assistant treasurer of the Minneapolis Gas Light Co., according to an announcement by **Harry K. Wrench,** president and general manager of the company. He succeeds the late **Maurice D. Read,** who died Sept. 1.

Peterson has been assistant secretary and assistant treasurer the past eight years. He joined the firm 16 years ago as a bookkeeper in the accounting department.



A. Q. Smith



M. A. Combs

• The appointment of **Mahlon A. Combs** as assistant secetary of the Industrial and Commercial Gas Section of the A.G.A. and of **Arthur Q. Smith** as publicity director of the same section, has been announced by **J. French Robinson,** president of the Association.

The position to which Combs has been appointed is a newly created post made necessary to the increased scope of industrial and commercial gas problems and activities. Combs has had 25 years experience in the gas industry. His most recent connection was in the research and development department of American Type Founders, Inc., with which concern he also worked in selecting sub-contractors for the production of ordnance products.

Smith will reestablish the publicity service to technical and business magazines which was carried on successfully for many years prior to the war. He comes to A.G.A. with an overall background of experience in advertising and publicity gained in an advertising agency of which he was a partner for a number of years. Previous to joining A.G.A. Smith was with the National Association of Manufacturers on field promotion, public relations and publicity.

• **L. Byron Cherry,** vice president of the Jersey Central Power and Light Co., Asbury Park, N. J. has announced his resignation from the company. He will return to private practice as a lawyer, becoming associated with the New York law firm of Hines, Rearick, Dorr and Hammond. Cherry became vice president of Jersey Central in 1943 and served at one time as an attorney for the Trustees of Associated Gas and Electric Corp.

• **Edward Falck,** who retired as director of the War Production Board's Office of War Utilities with the dissolution of that office Sept. 30, is establishing a business consulting service and plans to open offices in Washington and New York early this month.

Falck will engage in industrial management and public relations consulting work for individual firms, particularly in the public utility and natural gas industries.

• **K. M. Irwin** has been appointed manager of the engineering department of the Philadelphia Electric Co.

Following short terms of specialized work with the B. F. Sturdevant Co., Stone and Webster, Perry Barker, and the Navy, he joined United Gas Improvement Co. in 1919 as assistant to the electrical engineer of the operating and engineering department. He continued with that company until transferred to the Philadelphia Electric Co.

WARREN
LIQUEFIED PETROLEUM GAS

Look To Peacetime Growth With WARREN Butane and Propane

A large number of manufactured gas plants in small cities are unprofitable because of the high cost of labor, material and maintenance. Reduce operating costs of such plants by converting to Liquefied Petroleum Gas. Conversion can be accomplished with surprisingly little investment which will be written off by increased profits. Adequate supplies of Warren's Liquefied Petroleum Gas are now available for utility gas plant uses.

Don't overlook these fuels as substitutes for standby and peak load operations.

Warren's trained organization will be glad to give you the benefit of its broad experience, engineering advice and consulting service without obligation.

WARREN PETROLEUM CORPORATION
Tulsa, Oklahoma Houston, Texas

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BY GRAYSON
GRAYSON
HEAT CONTROL, LTD.
LYNWOOD • CALIFORNIA

in 1931 as assistant to the vice president in charge of engineering, the position he held at the time of his recent appointment.

• The election of **J. C. Gilbert,** Santa Monica District Manager of Southern Counties Gas Co., Los Angeles, to the company's Board of Directors to fill the vacancy created by the death of **Ferdinand R. Bain,** chairman of the Board and a director of the company since 1911 was announced Sept. 19 by President **F. S. Wade.**

Senior District Manager of the company, Gilbert has served in that capacity since March, 1920.

Gilbert's career in the gas industry began in 1912 with the Central Indiana Gas Co., of Muncie, Ind., where he served as assistant to the manager. He became affiliated with Southern Counties in 1918.

• **Leslie Brandt,** budget director of the Peoples Gas Light and Coke Co. was appointed assistant to the vice president in charge of finance and personnel, as of Aug. 9. His new duties include supervision over personnel functions and assisting **E. I. Bjork,** vice president in other matters as required. He will continue his duties as budget director. Brandt has been associated with the company since 1934 when he began as a junior staff auditor.

20-30-40 Gal. "Blue Flame" Water Heaters

ARE ROLLING OFF THE LINE

Our Production facilities are now working at full speed. This will make it possible—in a short time—to present a full line of Continental "Blue Flame" Water Heaters.

Then, the Continental Line—designed for every Purse and Purpose—will again make it possible for you to satisfy the needs of every customer—domestic and industrial.

Continental Water Heater Company Ltd.

1801 Pasadena Ave., Los Angeles 31, California

• **Basil Manly** resigned from the chairmanship of the Federal Power Commission on Sept. 12 to become president of the Atlanta Gas Co., the position formerly held by **H. Carl Wolf,** who resigned to accept the position of managing director of the A.G.A.

Nominated to vacancies on the FPC are **Harrington Wimberly,** an Oklahoma newspaper man and **Richard Sachse,** formerly of the California Railroad Commission.

• **Walter C. Beckjord,** president of Columbia Engineering Corp., and vice president and director of Columbia Gas & Electric, Corp. has been elected president of the Cincinnati Gas & Electric Co. by the utility's board of directors. He succeeds **H. C. Blackwell,** who asked the board to accept his request for retirement in accordance with provisions of the company's retirement plan. Blackwell remains actively with the company, as he was elected chairman of the board following the acceptance of his resignation as president.

W. C. Beckjord

Beckjord, who served as president of the A.G.A. in 1940, has been identified with the utilities industry since 1909. Upon his graduation from the University of Minnesota he went with St. Paul Gas Light Co., a subsidiary of American Light & Traction Co. of which he later became vice president and general manager. In 1930, he became vice president and general manager of Boston Consolidated Gas Co., leaving there in 1934 to join the Columbia Gas & Electric Corp. as vice president and general manager.

• **Harry A. Tiemann,** formerly state director of vocational education for Colorado, has been appointed educational director for the Public Service Co. of Colorado. He assumed his duties Aug. 15. While Tiemann's principal function will be that of educational director, his duties will be extended to cover certain phases of the company's industrial and promotional activities.

• **Phillip S. Magruder** has been elected to the Board of directors and appointed manager of the manufacturing department of General Petroleum Corp., it has been announced by **S. J. Dickey,** president.

Joining General Petroleum in 1925, Magruder's first job was testing. Later he became a gas engineer, then general superintendent, and in 1942 manager of the gas department. In May, 1945, he was made assistant manager of manufacturing.

• **J. N. Greene,** president Alabama Gas Co., has been elected a director of the A.G.A. to fill a vacancy until Nov. 1, 1945, caused by the resignation of **H. Carl Wolf,** who becomes managing director of the Association Oct. 1.

• **Henry Fink,** general manager Michigan Consolidated Gas Co., was elected a director to fill the unexpired term ending Oct. 31, 1946, caused by the death of John W. Batten, former president of the Michigan Consolidated Gas Co.

LABORATORY APPROVAL of design is by no means the last step in the Rheem system of quality control. Careful manufacture by skilled craftsmen is part of the pattern. A final *performance* test completes the process.

The picture above typifies this last, tough hurdle. This man is hydrostatic-testing tanks for Rheem water heaters. Before galvanizing, water is put into each tank. Then the pressure is built up to a point far in excess of normal operating requirements. Only leak-proof, pressure-proof tanks get by here. And every burner assembly is subjected to equally rigid inspection, while actually operating.

Whether it's for gas, electricity, oil or coal, every appliance turned out by the nine Rheem appliance plants must pass this "final exam." And, of course, every Rheem gas appliance carries the AGA Blue Star of Approval.

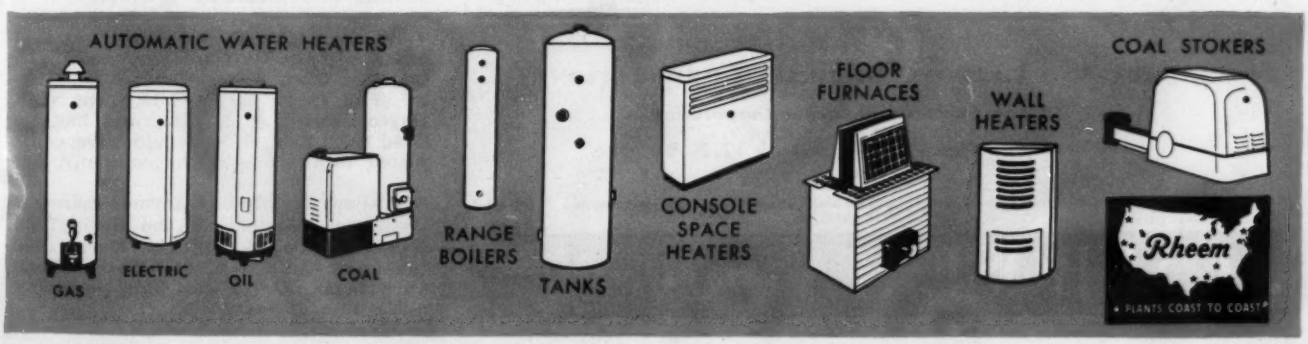
The return to full-scale production will not relax these uncompromising standards of quality. In the future, as now, your customers can count on trouble-free service from Rheem equipment. You can recommend Rheem with a clear conscience.

In your plans for the future . . . include Rheem

RHEEM MANUFACTURING COMPANY

General Sales Offices

New York • San Francisco • Los Angeles • Chicago



Manufacturers

• **Harry W. Smith, Jr.,** advertising manager of Selas Corp. of America (1941-45), director of publicity for the Industrial and Commercial Gas Section of the A.G.A. (1938-41), and research engineer and publications man for the A.G.A. Testing Laboratories in both Cleveland and Los Angeles (1931-36), announces affiliation with the John Mather Lupton Co., advertising agency, 420 Lexington Ave., New York City, beginning Oct. 1. He will serve as vice president.

At Lupton he will work primarily on stainless steel, metallurgical, chemical and industrial publishing accounts, in addition to general managerial duties.

• **H. L. Heakin** has been named a district representative for the A. O. Smith Corp., covering northern California, Utah and Nevada, and will soon establish headquarters in San Francisco. Heakin has had previous connections with the Worthington Pump and Machinery Corp., the Pacific Foundry Co., Domestic Engineering Corp., Union Switch and Signal Co., and Westinghouse Air Brake Co.

• **Waldo S. Hull** has joined the sales division of the Pittsburgh Equitable Meter Co.—Merco Nordstrom Valve Co., he will handle sales and service for Emco and Nordstrom in the Philadelphia and Washington area.

GAS LEAKAGE CUT 91 PER CENT

•

You get Results with CARBOSEAL anti-leak

A 1,700-foot section of a 4-in. main with cement joints carrying dry manufactured gas showed a leakage of 114 cu. ft. per hour before treatment. After treatment with Carboseal anti-leak, the leakage was cut to 10 cu. ft. per hour, a reduction of approximately 91 per cent.

This is one example of the results obtained in more than 6,500 *miles* of gas mains treated with Carboseal.

To get more information write for booklet, "Correcting Leakage in Gas Distribution Systems with Carboseal Anti-Leak."

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC **New York 17, N. Y.**

"Carboseal" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

CARBOSEAL *Anti-leak*

• **Herbert C. Erhard,** general sales manager of the Standard Gas Equipment Corp., has been elected vice president in charge of sales at a recent board meeting of the company. Erhard will have complete direction of sales of present products as well as new products that may be added. In addition, he will direct all advertising and promotion programs.

H. E. Erhard

Erhard joined the William M. Crane Co. in 1915 and when that company was merged with the Standard Gas Equipment Corp. in 1924 he was assigned to a field territory. After a succession of promotions he became general sales manager in 1935. He is a member of the A.G.A. and has served on various committees of the A.G.A.E.M.

Obituaries

• **Robert B. Harper,** 63, vice president, research and testing division, People's Gas Light and Coke Co., died August 29.

R. B. Harper

Harper entered People's employ in 1905 as a laboratory assistant. In 1906 he was promoted to chemist in charge of the laboratory. Successive promotions culminated in his election in 1930 to vice president in charge of the division of research and testing.

He received his BS degree in chemical engineering from Armour Institute of Technology in 1909. He was a member of numerous scientific societies and gas industry committees.

• **L. Howard Goldbright,** vice president and treasurer of the Heating and Plumbing Finance Corp., a subsidiary of the American Radiator & Standard Sanitary Corp., died suddenly on Sept. 1.

Goldbright, also vice president of Heating and Plumbing Finance Ltd., Canada, has long been a leader in the field of installment financing and is well known throughout the industry for his efforts in promoting the use of time payment terms in the sale of heating and plumbing products.

• **George Light,** 86, gas consultant and director of the Dayton Power and Light Co. died from a heart attack on July 27. His entire career was spent with Dayton Power and Light and had he lived until Sept. 4, he would have completed 70 years with the company.

• **Wallace H. Bradley,** former manager and vice president of the Springfield Gas Light Co., Springfield, Mass., died Sept. 4 at the age of 84. He had been an official of the gas light company more than 33 years.

It won't be long now!

Only O'Keefe & Merritt has the Vanishing Shelf and Grillevator Broiler

O'Keefe & Merritt Gas Ranges will soon be back! In every respect they will be the finest O'Keefe and Merritts ever to bear the name.

This new O'Keefe & Merritt will be distinguished in every detail–styled for the most exacting buyers. It will be precision-built by the same men and women of O'Keefe & Merritt who won the highest award for precision war production. And it will exhibit the advanced features, design and beauty for which O'Keefe & Merritt alone is renowned.

O'KEEFE & MERRITT

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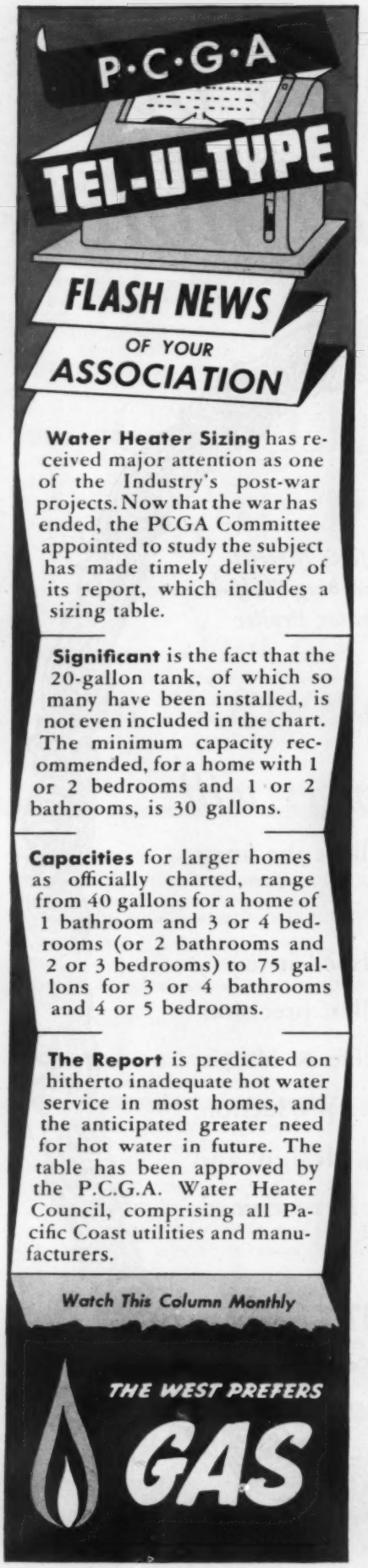

P·C·G·A
TEL-U-TYPE
FLASH NEWS
OF YOUR
ASSOCIATION
Water Heater Sizing has received major attention as one of the Industry's post-war projects. Now that the war has ended, the PCGA Committee appointed to study the subject has made timely delivery of its report, which includes a sizing table.
Significant is the fact that the 20-gallon tank, of which so many have been installed, is not even included in the chart. The minimum capacity recommended, for a home with 1 or 2 bedrooms and 1 or 2 bathrooms, is 30 gallons.
Capacities for larger homes as officially charted, range from 40 gallons for a home of 1 bathroom and 3 or 4 bedrooms (or 2 bathrooms and 2 or 3 bedrooms) to 75 gallons for 3 or 4 bathrooms and 4 or 5 bedrooms.
The Report is predicated on hitherto inadequate hot water service in most homes, and the anticipated greater need for hot water in future. The table has been approved by the P.C.G.A. Water Heater Council, comprising all Pacific Coast utilities and manufacturers.
Watch This Column Monthly
THE WEST PREFERS
GAS

Recent Decisions to Aid SEC in Utility Act Cases

Three recent developments are expected to aid the SEC in accelerating compliance by utility holding companies with the public utility act of 1935: These are:

1. In the Standard Gas & Electric Co. reorganization case, the circuit court of appeals in Philadelphia held that the commision has the right to alter creditor relationships in reorganization plans by sanctioning distribution of portfolio common stocks with cash to satisfy creditor claims.

2. Recent action of Engineers Public Service Co. in abandoning its previous intention of setting up regional holding companies and in filing a plan to dispose of its subsidiaries, Gulf States Utilities Co. and El Paso Electric Co. and then fall back on Virginia Electric & Power Co.

3. Progress which the commission has been making in resolving Section 11B2 problems of holding company systems. This is being done by distributing voting power more equitably among the various classes of security holders in the underlying companies, by strengthening the position of the equity stocks in earnings and assets, by disposing of intercompany claims and by generally strengthening the overall position of the individual systems as a forerunner to putting into effect Section 11B1 or physical integration features of the utility act. Integration of the actual properties is considered a relatively simple matter once the difficult 11B2 problems are ironed out.

Chicago Corp. Disposes of Interest in Tennessee Gas

A purchase group, organized and headed by Stone & Webster interests, have purchased from the Chicago Corp. all of the stock owned by it in Tennessee Gas and Transmission Co. The other members of the purchase group are as follows: Blyth and Co., Inc.; The First Boston Corp.; Kidder, Peabody and Co.; Lehman Bros.; Mellon Securities Corp.; Union Securities Corp.; White, Weld and Co.; W. C. Langley and Co.; Paine, Weber, Jackson & Curtis; Central Republic Co. (Inc.); Bosworth, Chanute, Loughbridge & Co.; George H. Clifford and H. Gardiner Symonds.

While no detailed plan has been developed with respect to the disposition of these stocks, it is contemplated that to permit the provision for adequate common stock equity capital for the company's future growth and junior capital structure will be simplified and expanded.

Seiple Heads Newly Formed Jersey Central Appliance Co.

The formation of the Jersey Central Appliance Co., with B. A. Seiple as president and treasurer; C. R. Butcher as vice president; and E. Stanley Marks as secretary has been recently announced. Seiple has been vice president in charge of sales for Jersey Central Power & Light Co. since 1928 and Butcher has been electric sales manager for that company since 1929.

The new company will sell a complete line of gas and electric appliances for homes, commercial establishments and industrial concerns, including radios and air conditioning throughout Monmouth and Ocean counties. A complete service department is included also in the plans. Headquarters will be at 701 Main St., Asbury Park, after Oct. 1, 1945 and additional sales offices and show rooms will be opened at Red Bank, Point Pleasant and Freehold immediately.

B. U. Employees Benefit From Hospital Plan

Employees of the Brooklyn Union Gas Co. benefitted to the extent of $22,077 through their membership in the Associated Hospital Service Blue Cross Plan during the 18-month period from Jan. 1, 1944 to June 30, 1945. Two hundred seventy-three claims were paid on behalf of employees and members of their families, the Associated Hospital Service reports.

Benefits of the plan have been liberalized recently to include:

1. Twenty-one days of hospital care, plus a 50% discount for an additional 180 days for each hospital admission for a different ailment, except in maternity and tonsil cases.

2. Up to $7.25 toward a hospital bill when a member requires the use of a hospital operating room but does not require admission as a bed patient.

3. Penicillin, sera, oxygen and use of equipment for administering oxygen—all are now provided free to subscribers who enter the hospital as patients.

4. Use of important hospital facilities —X-rays, operating room, laboratory examinations. All former cash limitations on use of these facilities have been removed.

About 1600 employees currently are enrolled as subscribers. About two-thirds of them hold memberships which also protect one or more members of their families.

Range Production To Reach 150,000 by December

The WPB reported on Sept. 17 that gas stove production is increasing and is expected to reach 150,000 in December. By June 1946, estimated production will reach 220,000 per month, well above the pre-war 1940-41 average monthly rate of 165,000.

New gas stove models will not appear on the market until some time in 1946, as they require new dies which are not yet obtainable. Production in the early months of 1946 will be limited to present models with only slight modifications, officials said.

The stove industry is now employing approximately 40,000 workers, compared with 51,000 prior to the war, WPB survey shows. Present expansion of production indicates that more than 60,000 workers will be needed in the industry by June, 1946. The gas range segment of the industry expects to absorb a manpower increase of 24% over prewar levels by June next year, according to officials.

Houston Conservation Plan Announced by Humble

The Humble Oil and Refining Co. has announced that four gas conservation projects costing $3,500,000 and designed to conserve 56,000,000 cu. ft. of natural gas daily for productive use, are to be constructed in Houston, Texas, within the next few months.

You *Buy Direct* from FLORENCE

Now that the war is over we're glad to be meeting you again in the old familiar ways. It seems good to be talking to you again about peacetime sales policies.

For 73 years the Florence Stove Company has followed the selling policy you prefer—giving you the advantages that only friendly, direct contact offers. Today Florence dealers are still buying direct and are thus in a preferred position to offer the greatest possible values, dollar for dollar.

To take care of you right, Florence distribution and service is nationwide. And as soon as reconversion is complete, Florence production of ranges and heaters will be even greater than before the war, with a third large factory . . . at Lewisburg, Tenn. . . . . added to greatly increased capacity in plants at Gardner, Mass., and Kankakee, Ill.

Meanwhile, Florence has been building up consumer demand for you with one of the largest advertising campaigns in the history of the industry. So we say it again! We're glad to be meeting you in old familiar ways once more. And that includes a reminder that, as ever, you can *buy direct* from Florence.

FLORENCE
Gas Ranges

FLORENCE STOVE COMPANY . . . General Offices and Plant: Gardner, Mass. Western Offices and Plant: Kankakee, Ill. Southern Plant: Lewisburg, Tenn. Sales Offices: One Park Avenue, New York; 1459 Merchandise Mart, Chicago; 53 Alabama St., S. W., Atlanta; 301 No. Market St., Dallas.

CURRENT READING

Piping Arrangements for Acceptable Flowmeter Accuracy—R. E. Sprenkle. "Transactions, A.S.M.E.", July, 1945, pp. 345-360. The author correlates data previously published on metering fluid flow through pipelines and analyzes the requirements for piping arrangements, according to interpretations developed from many actual field installations. Most of the recommendations given in the literature are based on standards of piping requirements established by the Joint A.G.A.-A.S.M.E. Committee on Orifice Coefficients. These standards as well as others obtained since that report was published in 1935 are shown in this paper in the form of seven schedules covering the use of "Orifices and Flow Nozzles," and an eighth schedule, applying to "Venturi Tubes" only. These schedules serve as the basis for developing typical piping layouts which are designed to interpret and clarify the principles involved from a practical application standpoint.

Thermodynamics of Producer Gas Combustion. Application to Internal Combustion Engines—A. P. Olesen and R. Wiebe. "Industrial and Engineering Chemistry", July, 1945, pp. 655-660. The composition and heats of combustion of producer gas derived from various raw materials are given. A nomograph is presented for calculating the heats of combustion of producer gas mixtures containing hydrogen, carbon monoxide, and methane. The theoretical air-fuel ratios of producer gas are compared with those of other fuels used in internal combustion engines, and attention is called to their importance in connection with carburetor design.

Casinghead Gas Accounting—K. R. Tibbets. "Oil Weekly", July 23, 1945, pp. 43-45. In the earlier days of the industry the only value of casinghead gas was the gasoline content value. Contrast this with the present day, when usually the value of casinghead gas consists of two other values in addition to the gasoline content value; namely, by-products or butane-propane value and residue value. Along this line it would be reasonable to say that these two additional values have approximately tripled the work in gas accounting. A typical procedure of gas accounting by a major operator in the Mid-Continent area is given in this article.

Plant Design of Compressor Piping—B. C. Thiel. "Petroleum Refiner", July, 1945, pp. 103-106. Calculation of compressor piping sizes can be based on three fundamental methods: pressure-drop method, gas-velocity method, and mass-velocity method. In this article each method is described.

Proceedings of the Twenty-Sixth Annual Meeting of the American Gas Association, held Oct. 5, 1944. Published by the A. G. A., 420 Lexington Ave., New York 17, N. Y.

Industrial Safety Tomorrow—a 16-page pamphlet produced by the National Safety Council, 20 No. Wacker Drive, Chicago 6. This pamphlet is part of a specific program designed and sponsored by 38 national organizations to help industry meet the threat of an increased accident toll under the changed conditions of the postwar period. A copy of the pamphlet may be obtained without cost from the National Safety Council.

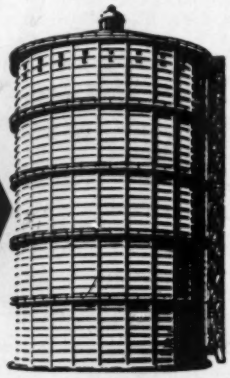
Postwar Labor Policy—A Survey of Opinion. A report on attitudes of 600 informed persons representing labor, management, and those professionally occupied in industrial relations on mediation and arbitration of postwar labor disputes and the government's role therein. Compiled by the Editorial Staff, Daily Report on Labor-Management Problems and Wage and Salary Regulation. Published by the Bureau of National Affairs, Inc., 24th and N. Streets, N.W., Washington, D. C.

Unusual Methods Used in Killing Wild Gas Well in Cement Field, Oklahoma—P. Reed. "Oil and Gas Journal," July 7, 1945, pp. 79, 80, 83, 84. Following investigation of the various possibilities of killing the Little Nick Oil Co. 4 Rigney, it was decided to drill a directional well, marking the second time the method has been employed in the state. The difficulties attendant thereto are described in this article in complete detail.

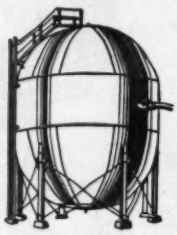
What the Foreman Needs for Success, A pamphlet containing tested methods of success for foremen, supervisors and department heads. Published by the National Foreman's Institute, Inc., Deep River, Conn. Price 25c.

Submit your Special "STEEL STRUCTURES" Problems to us

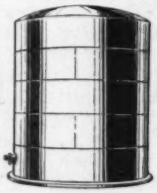
GAS HOLDERS



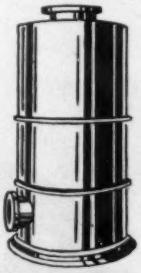
HI-PRESSURE TANKS



STORAGE TANKS



TOWERS, SCRUBBERS and CONDENSERS



Stacey Brothers' long experience and established policy of constant research have produced results in design, production, and field erection techniques that have definitely established their leadership in the fabrication of steel and its alloys. You profit from this policy thru more efficient designs, worthwhile weight reductions, and more stable structures with longer life.

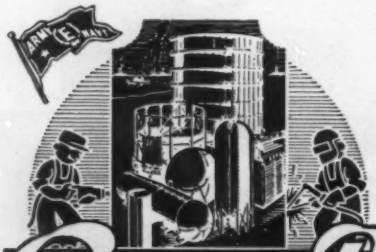
You can entrust your requirements for gas storage holders, storage tanks and bins, purifiers, towers, and similar structures to Stacey Brothers with full assurance of satisfaction in both service and product.

If you are working up plans now for such equipment, our experience and recommendations may be of valuable help to you. Write us now—no obligation.

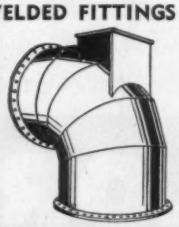
The STACEY BROS. GAS CONSTRUCTION CO.

One of the Dresser Industries

5535 Vine Street Cincinnati 16, Ohio



WELDED FITTINGS



Stacey Brothers ENGINEERS • FABRICATORS ERECTORS • RECOGNIZED EXPERIENCE & FACILITIES

Natural Gas for Industry Costs *Less* In OKLAHOMA!

The abundant supply, availability and low cost of natural gas for industrial uses is an important factor in present and postwar development of Oklahoma. Supplementing the adequate transportation facilities, natural resources and stable labor conditions this low cost fuel has attracted many industrial and manufacturing plants to the state.

DEPENDABLE SOURCE AMPLE RESERVES

Connected with many widely separated gas fields, Oklahoma Natural Gas Company assures its customers a dependable source of low-cost fuel and ample reserves. The 240 company owned gas wells which supply 20% of its requirements are supplemented by purchased gas from more than 300 wells in dry gas fields, oil fields and from gasoline plants.

5000 MILES TRANSMISSION AND DISTRIBUTION SYSTEM

The company's system includes some 5000 miles of transmission and distribution lines; serves 700,000 people in 100 communities in Oklahoma.

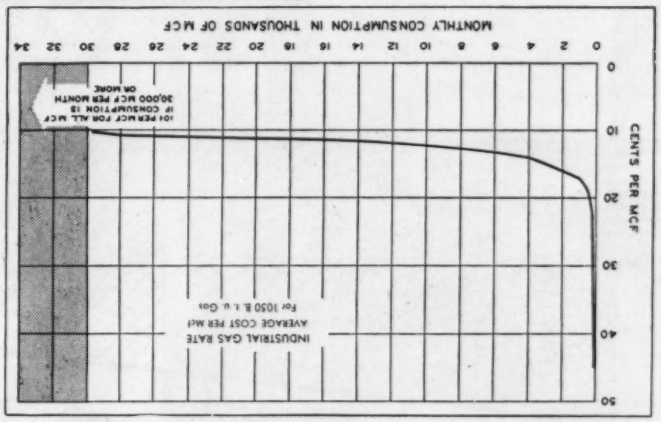
SERVES MANY CITIES— INDUSTRIAL CENTERS

The company serves approximately one-third of Oklahoma's population; supplies approximately 60% of all the natural gas consumed in the state.

The following Oklahoma cities over 10,000 population (1940 census) are served by Oklahoma Natural Gas Company:

Oklahoma City	**204,400**
Tulsa	**142,200**
Muskogee	**32,300**
Enid	**28,100**
Shawnee	**22,100**
Ardmore	**16,900**
Okmulgee	**16,100**
Sapulpa	**12,200**
Norman	**11,400**
El Reno	**10,100**
Stillwater	**10,100**

LOW INDUSTRIAL RATES


MONTHLY CONSUMPTION IN THOUSANDS OF M.C.F.
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34
0 10 20 30 40 50
CENTS PER MCF
INDUSTRIAL GAS RATE
AVERAGE COST PER M.C.F.
For 1050 B.t.u. Gas

The company's Industrial gas rates compare favorably with other Southwestern areas, providing a source of fuel adapted to industrial use at lowest cost, and other economies in plant operation. Automatic control of temperatures, steam pressure and furnace atmospheric conditions, possible through use of natural gas, make skilled operating labor unnecessary.

NOW SERVING STATE'S MAJOR INDUSTRIES

The versatility, efficiency and economy of Oklahoma's natural gas is reflected in the importance and diversity of the major industries already served by Oklahoma Natural Gas Company, including: brick, tile, cement and glass plants, oil refineries, cotton gins and cotton oil plants, ice, water pumping and electric power plants, steel and metal working plants, aircraft manufacturing plants, chemical and food processing plants, meat packing plants, zinc smelters, railroad shops and many others.

RESIDENTIAL AND COMMERCIAL RATES

Most residential and commercial customers pay 45c per 1000 for first 100,000 cu. ft. per month; 18c for all over 100,000 cu. ft. in any one month. Although one of the richest states in oil and coal deposits, little or no oil or coal is used for heating in communities served by Oklahoma Natural Gas Company.

INDUSTRIAL SERVICE DEPARTMENT

Our staff of industrial service engineers is always available to manufacturers and industries. Our engineers and specialists have developed many new applications for natural gas appliances. Analysis of requirements and fuel costs is always available to prospective industrial customers.

The management of this company urges your serious consideration of Oklahoma's multiplied industrial and manufacturing advantages, and pledges its earnest cooperation in every way. Your inquiries are cordially solicited.

OKLAHOMA NATURAL
Gas Company

General Offices: 624 South Boston Ave., Tulsa, Okla.

Nashville May Have Natural Gas by Winter

The properties of the Nashville (Tenn.) Gas and Heating Co. will be converted to the distribution of natural gas with a possibility that the new fuel will be used in Nashville by next winter, according to Wade Thompson, president of Tennessee Natural Gas Lines, Inc., which purchased the Nashville distributing utility last May.

Both Thompson and L. B. Richards, president of the Nashville Co., have stated that introduction of natural gas would mean a wide expansion in the system which at present consists of 300 miles of lines serving 18,000 customers, most of them domestic users for cooking only.

Gas will be supplied by Tennessee Gas and Transmission Co., which owns and operates the natural gas pipeline from Corpus Christi, Texas to Charleston, W. Va. Tennessee has applied to FPC for permission to increase its capacity from 204 MMcf to 263 MMcf daily, and Tennessee Natural Gas Lines has first call on the surplus.

Veterans Homes to Use Gas

Two hundred low rental homes, which are now being constructed at Calgary, Alberta, Canada, for veterans, will use natural gas for cooking and heating requirements, according to James C. Gray, Toronto general supervisor for Wartime Housing Ltd.

SEND FOR COMPLETE LIST OF ARCCO CHARTS
9 P.M.
Good News
BETA PENS
NOW AVAILABLE FOR IMMEDIATE DELIVERY
We've increased production again, so your orders for all styles of Beta Pens can be filled at once. • Beta Pens fit all instruments, have 2 to 4 times more ink capacity and use ink to the last drop. They make a uniform, unbroken line regardless of line thickness without excessive flow or blotting. Pens, shown actual size, can be arranged to reduce time interval between static and differential lines to few minutes only. Especially suitable for seven-day records, volumetric arms and pulsating flow. Order now — Price $1.00 (lower in quantity) — and remember, you get your money back if not completely satisfied.
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No. 300
No. 101
No. 200
No. 100
SEND FOR ARCCO CHART LIST
AMERICAN
RECORDING CHART CO.
3113 E. 11th St. Los Angeles 23, California

A.G.A. Reports Second Quarter Revenue Gain

Total revenues of the gas industry in the three months ended June 30, 1945 were $280,594,700, a gain of 4.4% over revenues of $268,648,100 in the comparable quarter of 1944, the A.G.A. has estimated. Customers on June 30 totaled 19,838,400, an increase of 2.2% over 19,419,000 customers a year earlier. These figures exclude sales to other utilities for resale.

Revenues for the manufactured and mixed gas industry for the June 1945 quarter were $111,748,200, a gain of 2.9% over $108,552,400 for the like 1944 quarter and natural gas sales revenues were $168,846,500 up 5.5% over $160,095,700 a year earlier.

Measured in volume of sales, manufactured and mixed gas send-out in the second quarter of 1945 was 121,350,400 Mcf, an increase of 2% over the like period of 1944 and sales of natural gas totaled 534,390,900 Mcf, a gain of 2.7% over the second quarter of 1944.

For the 12 months ended June 30, 1945, total revenues of the gas industry were $1,147,090,400, a gain of 4.4% over $1,099,068,500 a year earlier. Manufactured and mixed gas revenues were $449,973,900 a gain of 4% and natural gas revenues were $697,116,500, an increase of 4.6%.

Revenues from sales to residential customers, including house heating, in the second quarter of this year totaled $175,096,000, a gain of 4.5% over a year earlier. Commercial and industrial sales totaled $105,498,700, an increase of 4.3%. In the 12 months ended June 30, 1945, residential sales revenues were $716,118,600, an increase of 4.5% over a year earlier, and commercial and industrial sales revenues were $430,971,800, an increase of 4.2% over the previous 12 month period.

California Commission Cancels Surplus Gas Rule

The California Railroad Commission announced on Sept. 13 that Southern California Gas Co.'s petition for the cancellation of Rule A-5, limiting the service of surplus gas, had been granted. The regulation was established by the Commission in 1942 at the utility's request in view of the wartime emergency fuel situation. Under the regulation, service of surplus gas was limited to the then existing customers using that type of service, and new customers could secure surplus service only by applying to the Commission for a deviation from the rule. Removal of the restrictive rule, thus, has the effect of "unfreezing" surplus or "interruptable" gas service to industrial consumers, and any such consumer who can meet other requirements, may now apply for the rate.

N. L. Smith to Supervise Natural Gas Investigation

Following announcement of the resignation of Basil Manly as chairman and member of the Federal Power Commission, the Commission designated Commissioner Nelson Lee Smith to supervise its Natural Gas Investigation. Smith will be in administrative charge of the proceeding and will preside at the opening of the hearings.

The Commission also announced that it has assigned Marvin Farrington, examiner, to this investigation.

WHAT MAKES IT CLICK!

An exclusive feature of the Domestic Thermostat is the snap ring of the control unit which makes it *click*—indicating "on" or "off" action of the thermostat. This device insures instantaneous turning off or on of the water heater at the pre-determined temperature.

Domestic Thermostats "click" with water heater manufacturers because they are precision-built and continuously tested at every stage of assembly. Dependable, trouble-free performance in actual use is thus assured.

DOMESTIC THERMOSTAT COMPANY
156 West Pico Boulevard • Los Angeles 15, Calif.

ABOVE—The snap action of each Domestic Thermostat is checked with precision equipment to insure proper on and off action.

Domestic

WATER HEATER
THERMOSTATS
AND AUTOMATIC PILOTS

PIPELINE NEWS

• Gas utilities serving the Chicago area are making arrangements to meet the higher demands for gas which are anticipated in the immediate postwar period. **Chicago District Pipeline Co.**, a subsidiary of the **Peoples Gas Light & Coke Co.**, filed an application with the FPC on Sept. 14 for authority to construct additional facilities for the transportation of natural gas.

The present capacity of the system of Natural Gas Pipeline Co., which transports natural gas from Texas to the Chicago area, is approximately 268 MMcf per day, of which 235 million is available to the Chicago area. The new facilities proposed would increase the capacity of the pipeline system to 349 MMcf of which approximately 285 million would become available to the Chicago area.

• Construction work was started Sept. 8 on the Rogers Lacy and Lone Star Producing Co. gas recycling plant in the Carthage field, Panola county, Texas, while Lone Star was arranging to begin laying 12-in. pipe for a 95 mile gas pipeline from the company's plant at Trinidad, Henderson county, to the Panola plant location. The recycling plant will have a capacity of 50,000,000 cu. ft. of gas daily and will be located nine miles north of Carthage and one mile south of the Sabine river, on the Carthage-Marshall highway.

• Northwestern Utilities, Ltd., of Edmonton, Canada, is making surveys for a transmission line to carry natural gas from the Viking-Kinsella field in east-central Alberta to Camrose, Wataskiwin, Panoka, Lacombe and Red Deer. Voting on the franchise agreements will take place this month, and it is planned to deliver gas by the fall of 1946.

• Officials in Mexico City are planning the construction of a $20,000,000 natural gas pipeline from the Poza Rica oil fields near Tampico to Mexico City. Sole means of carrying natural gas into the capital city now is in steel cylinders.

The pipeline will be surveyed and built with local funds provided by the Nacional Financiera, semiofficial investment bank which is providing the working capital for many of Mexico's industrialization projects.

• The Federal Power Commission has authorized the Southern Natural Gas Co., Birmingham, Ala., to construct and operate about 116 miles of from 22- to 6⅝-in. natural gas pipeline in Louisiana, Georgia, Alabama and Mississippi, a 1200-hp. compressor station on the Montgomery-Columbus branch line near Wetumpka, Ala., and other facilities required to assure adequate deliveries of gas to its existing customers. The proposed facilities, which will cost an estimated $3,771,760, will increase the company's delivery capacity from the present 220,000 Mcf per day to 245,000 Mcf.

• The Federal Power Commission has granted authority to the Central Illinois Public Service Co. to construct and operate a 6-in. natural gas pipeline, approximately 20 miles long, between Tuscola and Mattoon, Ill., which will enable it to obtain its natural gas supply directly from Panhandle Eastern Pipe Line Co. to meet the requirements of its customers in the Matoon, Ill., area.

The FPC order directs Panhandle Eastern to establish a physical connection of its transmission facilities at or near Tuscola, Ill., with Central Illinois proposed facilities, and dismisses an application of Kentucky Natural Gas Corp for authorization to construct similar facilities for the purpose of augmenting the supply of natural gas sold to Central Illinois.

Canadian Hearing Resumed

The hearing being conducted into the natural gas situation in the Canadian province of Alberta by the provincial Natural Gas Utilities Board resumed at Calgary on Sept. 5 after a two months' recess. Shortly after resumption it was announced that an adjournment of three weeks, starting Oct. 15, was contemplated to allow one of the counsel acting for the government an apportunity to handle other business. On Sept. 12, testimony was offered by K. R. Teis of Tulsa, Okla., that the old British-American Co. gas gathering system in Turner Valley, now absorbed by the Madison Gas Co., is worth $154,000.

Customers like its
NEAT APPEARANCE!

AND good looks are only one of the many advantages of Transite Flue Pipe!

Light in weight, Transite Flue Pipe can be cut to size on the job, goes up readily, requires little support. It is rustproof, needs no paint.

Transite Flue Pipe is furnished in round and oval shapes, in sizes for all normal requirements. A complete line of fittings, couplings and other accessories is available.

* * *

For full details, write for booklet TR-13A. Address: Johns-Manville, 22 East 40th Street, New York 16, New York.

Johns-Manville

TRANSITE FLUE PIPE
For venting gas-burning appliances

"What I like about the

WAR CHEST"

Says a War Veteran

"When a fellow has been away from home, especially in the dictator countries, you sure appreciate the American way of doing things.

"That's what I like about the Community War Chest... it's American and democratic because nobody's forced to give. You just give because you feel like giving. And it makes you feel good to see money being used to do good. Even though we're all mighty happy that the war is over now, we musn't forget THE WAR ON WANT IS NOT YET WON. *There's still a big job to be done with War Chest dollars."*

"It's sure tough to see how kids in foreign countries have been hit by war. Now they seem bewildered and lost in Peace. It is good to see how America goes on helping them and that America has the spirit to continue helping them.

"Think of the young seamen in the Merchant Marine or the older hands working a Liberty ship across the Pacific. Their job will go on long after the last gun was fired, carrying supplies to hundreds of island outposts and bringing my buddies home again. When these men hit shore, in any one of 94 ports, they are sure glad to find a decent, clean American club of their own, run by the United Seamen's Service. War Chest dollars put them there.

"You ought to hear the boys read letters telling of the swell things done for their wives and folks back in the states by the local agencies of the Community War Chest. Help when babies come. Help for womenfolk travelling or just kindly understanding and aid when a situation gets all fouled up. Give all you can to the War Chest and make it a Victory Chest now. War Chest dollars still face a big job ahead."

"Come on, you guys. Show's on tonight!" To the million or more on the lonesome job of occupying island dots in the ocean, a big lift comes from seeing a movie in technicolor and full of hummy songs or a live-talent show put on by the USO. It's a continuous performance to 2,000,000 men a week, provided through the War Chest.

"Ever been homeless? There are millions of fine people destitute and homeless throughout Europe and the Philippines and China. Homes have been destroyed and families separated. There is a long, long job ahead in resettlement. Your War Chest dollars are needed to help them.

GIVE GENEROUSLY TO Your Community War Chest

P·G·and E· PACIFIC GAS AND ELECTRIC COMPANY

Survey Favors Gas Range Over Electric 22-to-1

It's the gas range 22 to 1, according to a survey made by A.G.A. among utilities representing approximately one-half of the 20,000,000 gas meters in the U. S.

The 141 companies who supplied information estimated that there are 488,080 electric ranges in the territories where they serve 10868,937 gas customers. On the basis of these figures, 4.54 potential gas cooking customers use electric ranges.

While 158,053 of the electric ranges ranges and 53,280 gas ranges replaced electric ranges.

The results are based on approximately the same number of natural gas and of manufactured and mixed gas customers. 5,096,919 of the meters included in this study were served with natural gas and 5,201,410 with manufactured and mixed gas.

It is interesting to note the comparison of electric range saturation in territories served with various types of gas. In the manufactured and mixed gas territories surveyed, 264,399 electric ranges are in use, of which 109,578 replaced gas ranges. In the same territory, 18,486 gas ranges replaced electric ranges.

Fewer electric ranges are in use in natural gas territories. In these areas are 204,030 electric ranges, of which 42,955 replaced gas ranges. 32,954 gas ranges replaced electric ranges.

FOUR TOP FLIGHT ENGINEERING JOBS OPEN

Progressive, high-ranking manufacturer has unusual opportunities for several qualified engineers in Chicago Plant.

Because of our greatly expanded program of production and development over pre-war operations, we have important and immediate openings for the following well-paid positions:

Chief Engineer
Design Engineer
Combustion Engineer
Research Engineer

If you believe you have the experience background, cooperative ability, are ambitious for a permanent future with a gas range manufacturer of 75 years established reputation—write your qualifications in detail to—

CRIBBEN AND SEXTON COMPANY
700 No. Sacramento Blvd.
Chicago 12, Illinois
Dept. FD

Post-War Expansion

We have an opening on the Pacific Coast for a reliable, experienced company or individual to sell Vulcan diaphragms for gas meters, regulators and governors. Postwar expansion provides excellent opportunity for good connection. Write full details, experience, references, etc., first letter. Vulcan Proofing Company, 1st Avenue and 58th Street, Brooklyn, N. Y.

Wimberly, Sasche Nominated to Fill FPC Vacancies

President Truman has sent the names of two men to the Senate to fill vacancies on the Federal Power Commission. He nominated Harrington Whimberly of Oklahoma, to the position advocated by Chairman Basil Manly, and Richard Sasche of California, to succeed John Scott.

Chairman Manly, whose term expires June 22, 1948, resigned after many years in the Federal service, to accept the presidency of the Atlanta Gas Light Co., Atlanta, Ga. Scott, whose term expires June 22, 1947, resigned several months ago to enter the private practice of law in Washington, D. C.

Wimberly, Oklahoma editor and publisher, is chairman of the Oklahoma State Central Democratic Committee. He is a graduate of the University of Oklahoma and a member of its Board of Regents. Sasche is a member of the California Railroad Commission and served as its chief engineer before becoming commissioner. At one time he was director of natural resources of California. He has been an active member of the National Association of Railroad and Utilities Commissioners. He is chairman of NARUC's Valuation Committee, member of the Committee on Cooperation Between the State and Federal Commissions, and a member of a special committee of five studying telephone regulatory problems in cooperation with the Federal Communications Commission.

Amer. Stove Ads Cooperate With Cabinet Manufacturers

Current national magazine advertising of American Stove Co., while following closely the "New Freedom" gas kitchen promotion of the A.G.A., introduces a new note by naming manufacturers of cabinets shown with the Magic Chef ranges in the attractive kitchens featured.

The company believes that through this means of cooperating with cabinet makers, it will help its retailers, who are equipped to do so, sell complete kitchen cabinet equipment along with the Magic Chef ranges.

A broadside, which opens up to provide a window display of 12 "New Freedom" kitchens credited to the cabinet makers who designed them, has been supplied all American Stove retailers. On the reverse side, dealers are given tips on kitchen planning and are urged to write the cooperating cabinet makers for complete information.

Canadian Utility Plans $1,000,000 Expansion Program

Tenders have closed and contract will be awarded in the near future for a million dollar expansion program at the gas plants of the B. C. Electric Railway Company in Vancouver and Victoria, Canada. The company has received a tender of $650,000 for a carburetted water gas plant to supplement present gas facilities in Vancouver. A bid of $300,000 has been received for the erection of a smaller plant in Victoria.

E. H. Rohrer, manager of the gas department of the company in Vancouver, states that the new unit there will jump capacity to 12,000,000 cu. ft. daily. Two present plants have a joint 9,000,000-ft. capacity.

Employing the latest methods of manufacture by use of crude oils and surplus coke, the new plant will be self contained and modern. Expenditure is another part of the company's postwar $50,000,000 expansion program.

The company's gas department is also laying a new 12-in. main from Keefer Street to Sixth Avenue and Quebec Street, Vancouver, at cost of over $100,000 to improve pressure conditions in the area.

After installation, present annual coal consumption of 115,000 tons can still be increased. In addition to requiring all available supply of Vancouver Island coal, of the type suitable, additional supplies will be brought from Fernie and Alberta. The Island shafts provide about 40% of the present consumption. In 1916 the company's annual coal requirements totalled 5000 tons.

Zenith Gas System Granted Franchises

Zenith Gas System, Inc., through W. L. Woodward, Alva, Okla., president, reports that his company was recently granted franchises in Alva, Woodward, Cherokee, Waynoka, Mooreland, Quinlan and Avard, all in Oklahoma, which his company serves with natural gas supply and distribution. In these towns represented by 4700 meters, the citizens only registered a total of 13 votes against granting the franchises, which run for 25 years in each town.

M. Woodward also reports that his company is completing a construction and service improvement program in preparation for the coming fall and winter months which includes:

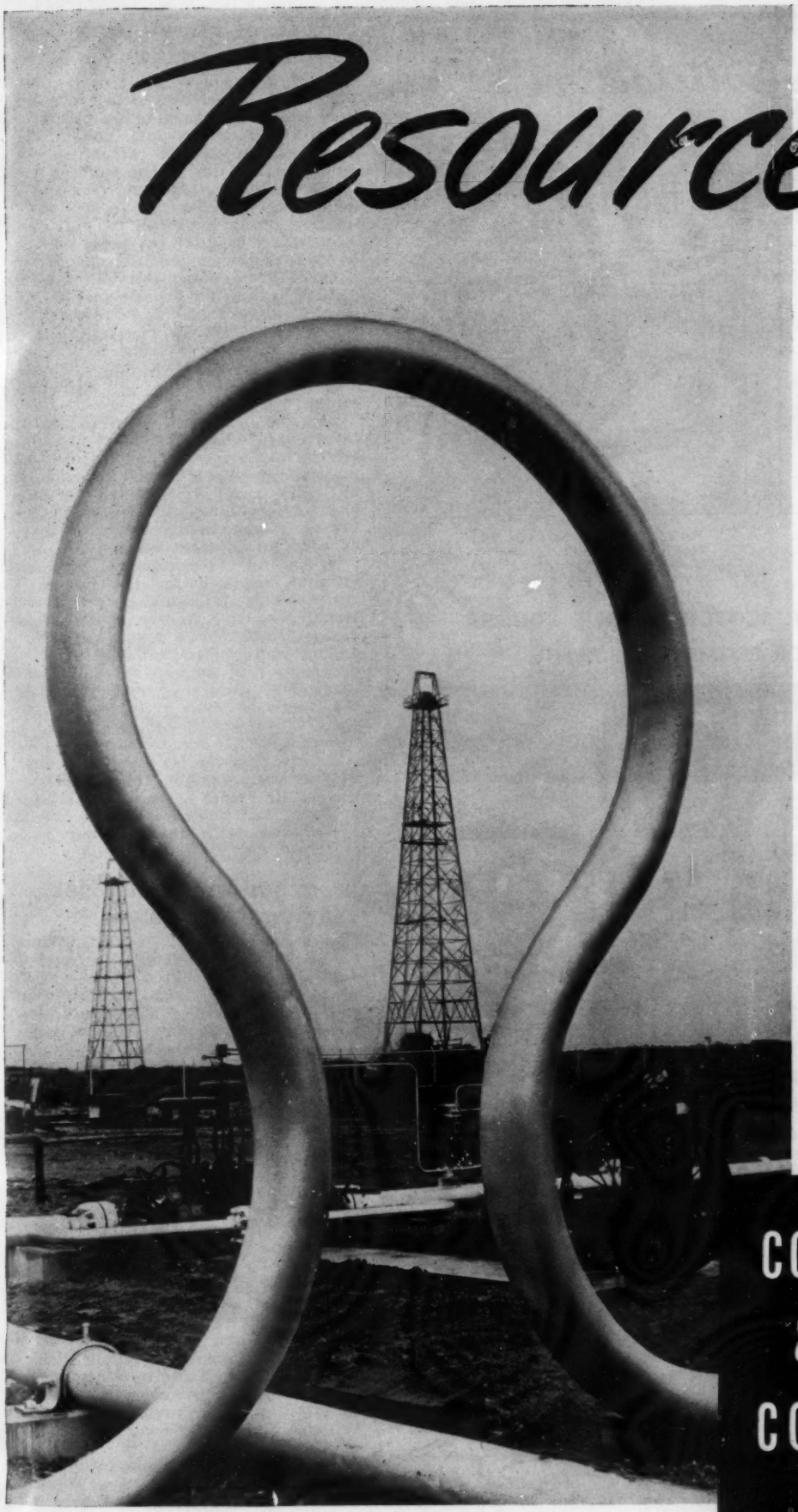
Laying of four miles of 3½-in. transmission line and one mile of 2-in. distribution pipe to serve the town of Ingersol; five miles of 8⅝-in. replacing five miles of 6-in. pipe on the Kansas line to serve the town of Hartner, Kans.

The company receives its gas supply from wells in Barber county, Kans., having pressures ranging from 1000 to 1600 lbs.

Roots-Connersville Expands

Roots-Connersville Blower Corp. is making extensive improvements in its offices at the plant in Connersville, Ind., providing six additional offices, a conference room and a drafting room. The company also plans to modernize the rest of the offices by installing an up-to-date heating and ventilating system throughout.

Resources...



THE GAS-BORN flame of the kitchen range is an every-day phenomenon.

Behind it lie the resources of a phenomenal industry.

They are the vast, untapped reserves of natural gas . . . the thousands of miles of pipelines that carry it to hundreds of thousands of homes and industries . . .

They are operational efficiency . . . sound fiscal policy . . . management's integrity.

These are the kinds of resources that enable the Columbia System to pledge public service to 1600 communities in an area supporting more than 5,000,000 people, for years to come.

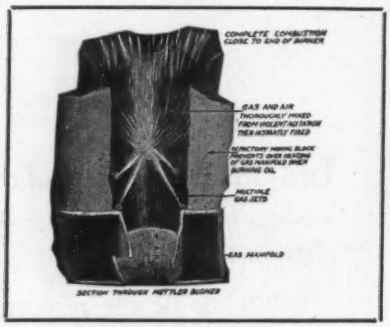
COLUMBIA GAS & ELECTRIC CORPORATION

COLUMBIA SYSTEM

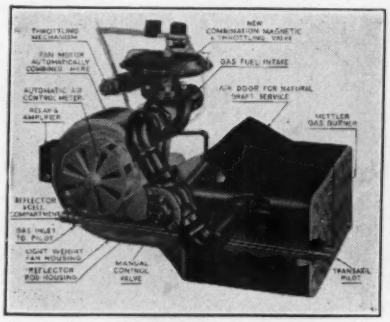
"Customer Satisfaction"

IS ASSURED WHEN YOU SPECIFY

METTLER BURNERS


COMPLETE COMBUSTION CLOSE TO END OF BURNER
GAS AND AIR THOROUGHLY MIXED FROM VIOLENTLY SWIRLING STREAMS
MULTIPLE GAS JETS
GAS MANIFOLD
SECTION THROUGH METTLER BURNER

Here is how the Mettler burner mixes gas and air. Its unique design insures thorough mixing and prompt ignition.



Here is the completely assembled Mettler "Fan-Air" mechanical draft automatic gas burner designed to fit a modern day need.

NOTHING BETTER FOR SCOTCH MARINE BOILERS

AMPLE STOCK FOR PROMPT SHIPMENT.

LEE B. METTLER CO.

406 SOUTH MAIN STREET ★ LOS ANGELES 13, CALIFORNIA

CLIP THIS AND MAIL TODAY

IF YOU ARE NOT A REGULAR SUBSCRIBER TO **GAS**

In GAS each month you will find dozens of ideas that will help you know your business better and do your job better. Just one of these ideas coming to you on our pages can pay you many, many times the small cost of a subscription.

GAS . . . 1709 WEST EIGHTH ST., LOS ANGELES 14, CALIFORNIA

Please enter my subscription to GAS for . . .

2 YEARS $3.00 ☐ **1 YEAR $2.00** ☐

☐ Check is enclosed ☐ Please bill me

NAME_____ POSITION_____

COMPANY_____

STREET CITY ZONE STATE

Bureau of Mines Uses Helium As Tracer Gas

According to a recent report by the Bureau of Mines, helium is being used as a tracer gas, turning up heretofore unknown facts about underground migrations of oil and gas, which may be of untold value to the gas and petroleum industry. Although the use of helium as a tracer gas is still in its infancy, it is expected to provide a long-sought tool for the study of subsurface reservoir conditions.

The report of the Bureau of Mines covered extensive experiments in the development of Naval Petroleum Reserve No. 1, Elk Hills, Kern county, Calif. The work is being done in cooperation with the Navy's Office of Naval Petroleum and Oil Shale Reserves.

The use of helium as a tracer gas involves injecting the inert gas into the underground oil and natural gas reservoir through the well bores at one or more carefully selected locations and determining the presence of helium, if any, in the natural gas produced from adjacent wells.

By careful observation of the length of time required for the helium to travel from the injection well to adjacent producing wells and of the concentration of helium found in the producing wells, petroleum engineers and geologists will be able to chart with reasonable accuracy reservoir conditions between wells and determine the pattern of drainage of the gas and oil through the porous reservoir rock.

Because helium is chemically inert, it is uniquely valuable for this purpose in that its identity, readily determined by laboratory analysis, is not lost by combination with the reservoir rocks or fluids.

Brooklyn Union Booklet Previews Appliances

A 16-page booklet entitled "What's Cookin'?" was distributed during September by the Brooklyn Union Gas Co. to the 276,000 familes living in one and two family houses in Brooklyn Union's territory. The booklet presents a preview of the newly improved appliances and service the company will offer its customers for their peacetime homes.

The booklet also features facts and pictures dealing with New Freedom Gas Kitchens and home planning, a description of the "plus features" embodied in the new gas ranges, and helpful information about year-around air conditioning by gas, house heating, water heating and the Servel gas refrigerator.

Michigan Commission Opposes Panhandle Line

The Michigan Public Service Commission will oppose an application by the Panhandle Eastern Pipepline Co. for permission to export natural gas to the Canadian province of Ontario, William McBrearty, commission chairman, declared Sept. 11 in Lansing.

He said Michigan's opposition is due to the fact that the state was able to purchase only 37 MMcf. of gas from the Panhandle company although 100 MMcf. could have been used. The Union Gas Co. of Canada, Ltd., which operates in western Ontario, is seeking 5½ MMcf. annually.

TODAY

WE ARE SALESMEN AGAIN

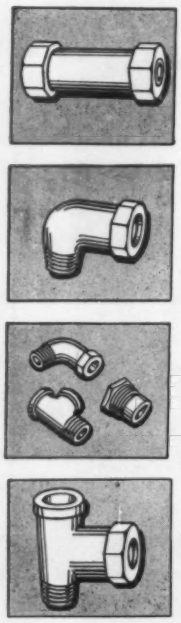
We of the P. C. G. A. are busy at reconversion and faced with a pent-up demand for new products. The industry's research laboratories have given us improvements that make the new gas appliances doubly desirable. Manufacturers, both local and national, are already in production. In January we'll see the new Servels. Automatic gas heaters and many gas ranges are already here. The latest "CP" deluxe model ranges are rapidly getting under way. And the newly developed dealer plans of our sales organization will soon be announced. In all ways we are ready to help strengthen the leadership of natural gas in Southern California . . . and we welcome the fact that today we are salesmen again.

SOUTHERN COUNTIES GAS COMPANY

MODERN, PRACTICAL, FLAME-PERFECT GAS

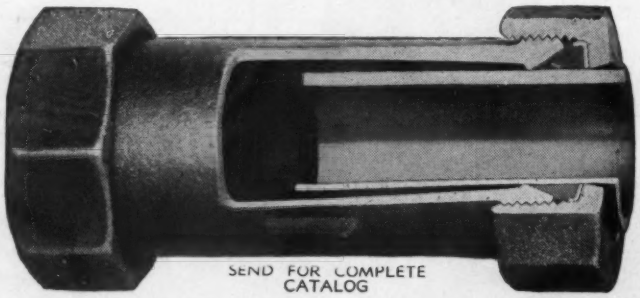
NORMAC COUPLINGS
SLEEVES AND FITTINGS

for maximum deflection, ease of "stabbing," complete confinement of the rubber!



So close are "Normac" rubbers confined at the gasket tip that possibility of flow is reduced almost to "nil." These couplings, sleeves and fittings . . . approved by gas utility men across the country for their time-saving features, ease of handling and dependable service . . . are available in a complete range of sizes. Made from air furnace malleable iron they provide greater wall thickness than pipe on which used.

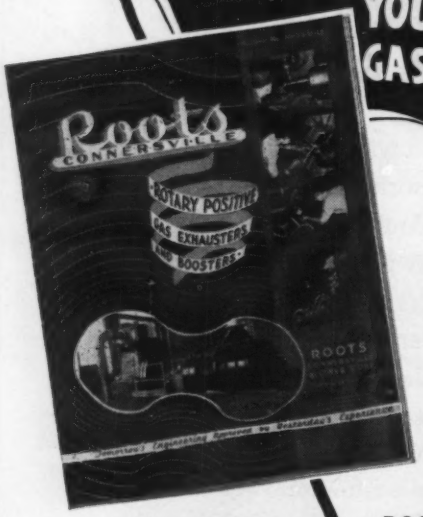
NORTON-McMURRAY
MANUFACTURING COMPANY
39 South La Salle St. Chicago, Ill.



SEND FOR COMPLETE CATALOG

Couplings - Meter Bars - Sleeves - Cocks - Bell Joint Clamps - Service Tees & Ells

THIS BULLETIN CAN HELP YOU *Select your* GAS PUMPING EQUIPMENT



Twenty pages, profusely illustrated, give detailed explanation of advantages of Rotary Positive principle, including explanatory charts and curves. Features of Roots-Connersville construction and design are fully covered, along with an assortment of installation views showing diversity of application for which the various types of Gas Pumps are suitable. Capacity and dimension tables cover the standard units, for moderate pressures. A copy of Bulletin 32-33-B-12 is yours for the asking, without obligation.

ROOTS-CONNERSVILLE BLOWER CORP.
One of the Dresser Industries
510 Oregon Ave., Connersville, Indiana

Roots CONNERSVILLE SINCE 1854
Rotary Positive GAS BOOSTERS

Laboratories To Resume Inspection of Appliances

The American Gas Association Testing Laboratories have notified manufacturers of gas appliances that annual inspections of approved appliances in production will be started soon.

According to R. M. Conner, director, a number of inspections this year may be made somewhat later than usual in order to give time for the process of reconversion to peacetime appliance production. It is expected that several months will be required to carry out the entire annual inspection program.

The majority of inspections will be made from the Cleveland Laboratories and the remainder from the Pacific Coast branch. Ample advance notice will be given manufacturers so that mutually satisfactory arrangements can be made.

In addition to factory visits, inspections will be made in warehouses where appliances are stored, in department stores and on dealers' sales floors. Calls are also occasionally paid to consumers' homes for the purpose of checking not only individual appliances but their installation as well.

Worthington to Produce Air Conditioning Equipment

Worthington Pump and Machinery Corp. has completed plans to turn a large part of its heavy ordnance manufacturing facilities in Holyoke, Mass. into production of air conditioning and refrigeration equipment of the latest design. Facilities for the operation have been moved there from the corporation's plant in Harrison.

Engineers are concluding designs for a new line of Freon-12 refrigerating compressors. Also to be produced at Holyoke will be a line of air handling equipment including air conditioning units, shower condensers, product coolers, and evaporative coolers in a wide range of sizes and capacities.

Louisiana To Call Proration Hearing

A public hearing to determine the feasibility of prorating natural gas in Louisiana will be called within the next 60 to 90 days, it was announced Sept. 6 by Commissioner Joseph L. McHugh of the state department of conservation.

Commissioner McHugh said in letters to gas producers, operators and gas and pipe line companies that the hearing would be called to "more equitably distribute the market demand for gas among the wells in the state and to otherwise carry out provisions of act 157 of 1940.

San Diego Utility Returns To 40-Hour Week

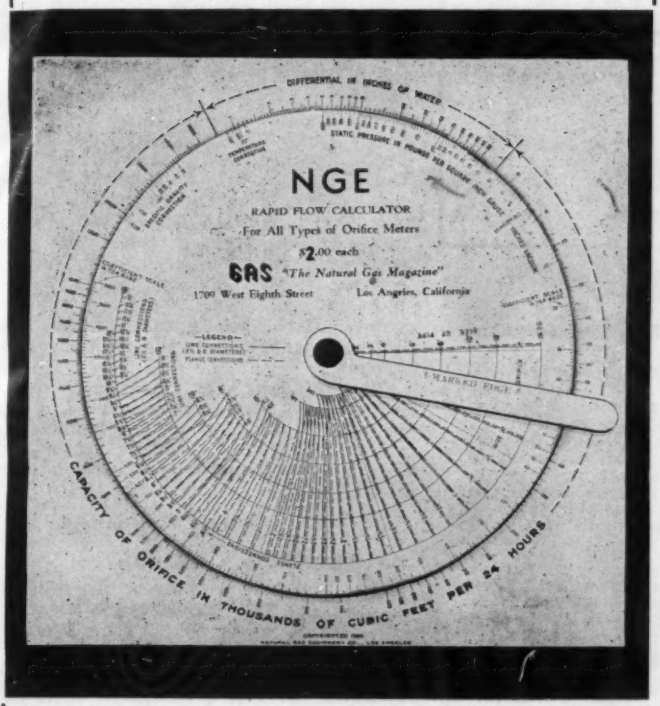
The San Diego Gas and Electric Co. on Aug. 19 returned to a 40-hour week after two years of working on a 48-hour work week basis.

Under the 40-hour work week now in effect in the company, some departments, due to press of work or shortage of workers, may find it necessary to work on Saturdays. Such work will be considered temporary and will be discontinued as soon as conditions permit. The overtime rate for the sixth day of the work week will be double time.

NGE RAPID FLOW

CALCULATOR

FROM 2 inches TO 16 inches


NGE
RAPID FLOW CALCULATOR
For All Types of Orifice Meters
$2.00 each
GAS "The Natural Gas Magazine"
1709 West Eighth Street Los Angeles, California
CAPACITY OF ORIFICE IN THOUSANDS OF CUBIC FEET PER 24 HOURS

. . . will quickly compute any of a series of variables in the transmission of natural gases.

SIMPLE to operate: Set dial . . . Turn indicator . . . *and instantly find*

1 COEFFICIENT and VOLUME
2 CORRECT ORIFICE SIZE IN ANY GIVEN VOLUME
3 DIFFERENTIAL PRESSURES

Our NGE CALCULATOR has been tested in field and desk use. Why not let it *help you* with your daily problems. If interested send in coupon and you will receive our calculator in a few days.

GAS
1709 West Eighth Street
Los Angeles 14, California

$2.00 EACH
25% discount on all orders for 25 or more

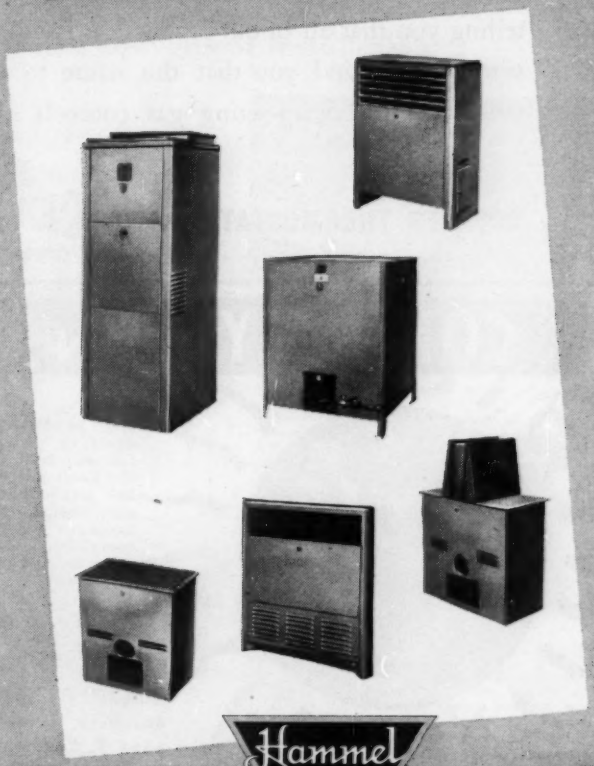
Gentlemen: Please send me.....NGE *Gas Flow Orifice Calculators* for which I am enclosing my check or money order for $.....*Add 2½% sales tax in California. Canadians add 10% excise tax.*

NAME .....

COMPANY .....

ADDRESS .....

THE HAMMEL LINE



Hammel
RADIATOR ENGINEERING CO.
SINCE 1912

Sell

satisfied customers Hammel Gas Heating units. Write today for the sales-making advantages of the Hammel line.

SATISFY YOUR CUSTOMERS with an appliance exactly suited to fit their specific need. The complete line of Hammel gas heating and ventilating units are styled and built to please the most careful buyer. You can sell a Hammel and be confident of customer satisfaction.

Write for complete information on Hammel Gas Heating Equipment. All units carry the AGA seal of approval.

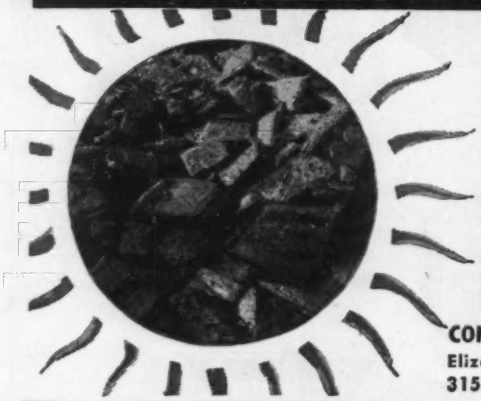
There are still a few attractive territories open to aggressive dealers.

IT'S LIKE *writing* A LETTER HOME

These ads month after month . . . telling you that all of our production is going to war . . . are simply to remind you that the name to remember when you want real snap-acting gas controls after the war is

SPENCER THERMOSTAT CO. KLIXON ATTLEBORO, MASS.

CONNELLY IRON SPONGE



High in efficiency . . . low in cost. In hundreds of plants throughout the country, Connelly Iron Sponge has proven itself . . . the finest purification material on the market. Not only does it lower your purifying cost but its high activity and capacity tends to reduce distribution and service complaints because of the cleaner gas which ultimately lowers operating and maintenance costs.

If you have a problem in gas purification, Connelly's 68 years of experience is at your service. Our engineers can help you . . there is no obligation on your part.

CONNELLY IRON SPONGE & GOVERNOR CO.
Elizabeth, N. J. Los Angeles, Calif.
3154 S. California Ave., Chicago 8, Illinois

GAS METER INDEXES AND FITTINGS

Many Standard Meter Parts Carried in Stock

We will be pleased to submit quotations to your specifications and blueprints.

THE E. F. GRIFFITHS CO.

346 E. Walnut Lane Philadelphia 44, Penna.

SEMET-SOLVAY ENGINEERING CORPORATION

Blue Gas Plants
Water Gas Machines
Washer Coolers
Naphthalene Scrubbers
Gas Purifiers
Condensers
Waste Heat Boilers
Producer Gas Plants

40 RECTOR STREET, NEW YORK, N. Y.

Ark.-La. Gas Co. Installs New Regulator Station

The Arkansas Louisiana Gas Co. has recently completed a new regulating station, located on Ford Street, Shreveport, La., replacing the old station and dispatcher's office. This station supplies the Southwestern Gas and Electric Co.'s Arsenal Hill power plant with approximately 18,500,000 cu. ft. of gas daily and also supplies the city water works.

The newly constructed Ford Street station is equipped with sensitrols and valves, a new method of pressure control. It is designed to receive gas from the company's own field lines, or from the United Gas Pipeline Corp. By the means of control valves, gas can be discharged through three 10-in. regulators to which are attached sensitrols into a common header from which the gas passes into the Shreveport system to supplement the company's supply from other sources, when necessary, or it can supply only the electric plant, or both.

The regulation of this equipment is effected through controls on a panel in the dispatcher's office, eliminating the necessity of visiting individual regulators for each pressure adjustment.

Western Stove Sponsors Suggestion Contest

Gas company employees are eligible to compete in a "Suggestion Contest" now being sponsored by the Western Stove Co. on the Pacific Coast. Purpose of the contest is to find out what improvements the average housewife would like to see in her postwar gas range. The contestant may procure a questionnaire form by writing Western Stove Co., Inc., Culver City, Calif. The contestant then records what sensible, practical betterments she, would enjoy having in her gas range.

The completed questionnaire should then be taken to any Western Holly dealer. Winners receive orders for six-burner automatic "CP" gas ranges, one of which is being given away each week during the 13 weeks.

Wilputte Awarded Two Coke Oven Contracts

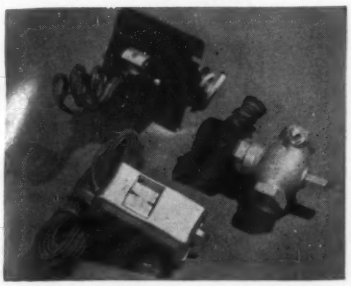
In addition to a contract for 177 by-product coke ovens, consisting of three batteries of 59 ovens each, together with by-product recovery equipment, recently awarded to the Wilputte Coke Oven Corp. by the National Tube Co., the Wilputte organization is constructing 47 by-product coke ovens for Citizens Gas and Coke Utility at Indianapolis, Ind. The National Tube project is the largest coke construction contract awarded by the steel industry in recent years.

United Light to Sell Stock In Wisconsin Utilities

The United Light & Railways Co. has filed with the SEC a plan to sell the common stock of the Milwaukee Gas Light Co., Madison Gas & Electric Co. as well as two Michigan subsidiaries which it is to receive on liquidation of American Light & Traction Co. Under the proposed plan, the company would apply the proceeds from the sale of the common stock to the reduction of its senior securities.

Controls--buy the package

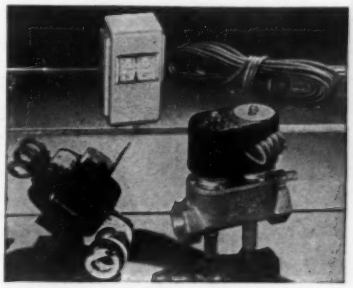
General Controls presents 8 convenient packaged sets, for compact inventory and convenient installation



T-30—GAS HEATING PACKAGE SET

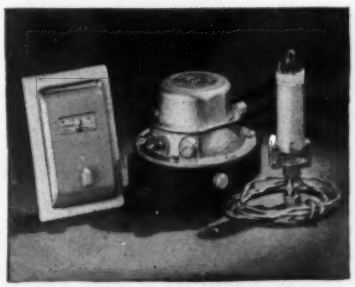
T-30—This set includes silent 2-wire gas valve, 2-wire Metrotherm, transformer, 30 feet of wire. Ideally adaptable to gas-fired boilers, floor furnaces, conversion burners and warm air furnaces.

Here are eight finely engineered, field proved package sets most frequently needed by heating contractors and engineers. Instead of purchasing piece-by-piece, buyers can select complete sets in compact cartons, each set including essential units required, thereby avoiding cost and delay in extra bookkeeping, ordering and handling individual items. Ask for new Service and Instruction Manual on Automatic Gas Heating Controls, No. *SI*-100.



T-40—GAS HEATING PACKAGE SET

T-40—Includes dual Thermostat, dual valve, transformer and 30 feet of wire. Provides fully automatic, hi-low firing, maintaining ideal temperature control and lowered fuel cost.

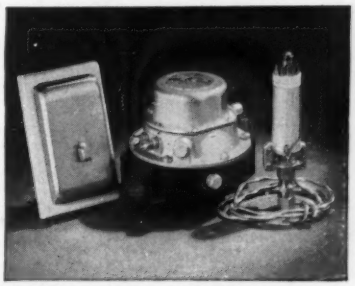


T-90 STANDARD THERMOMETER SET

Set combines improved B-60 Gas Valve, flush mounting Trimtherm, (with or without thermometer, or Timer Thermostat), Pilot Burner Generator and 30 feet of wire. Positive remote control for gas and floor furnaces, boilers, circulators, radiators.

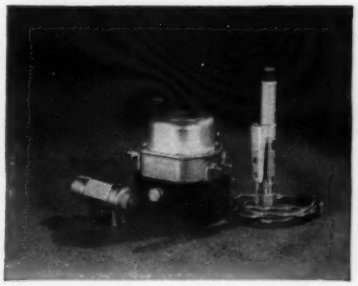
T-23—OIL HEATING SET

For remote thermostatic control of oil heating furnaces, circulating heaters, conversion burners, etc. Includes solenoid oil valve with by-pass adjustment for minimum flow regulation or pilot, two-wire metrotherm, transformer and 30 feet of control wire.



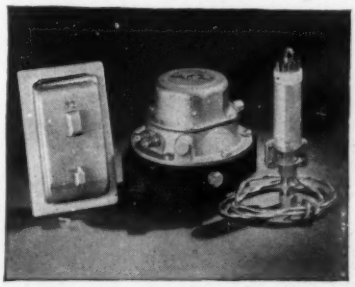
T-85 PLAIN THERMOSTAT SET

Includes B-60 Valve, Pilot Generator, Thermostat and 30 feet of control wire. Suitable for manufactured, mixed or natural gas. No outside current required, thermocouple pilot generator provides current for valve operation.



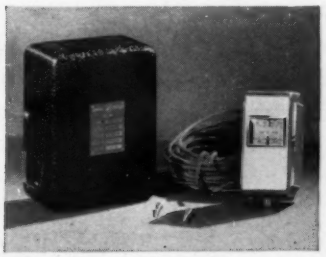
BX-250 WATER HEATER SET

New all-gas electric set combines tank Thermostat, B-60 Gas Valve and Pilot Generator for hot water heater applications. Remote thermostat, clocks or other limit controls may be connected in circuit.



T-95 TIMER SET

Includes B-60 Valve, Pilot Generator, Timer, Thermostat and 30 feet of wire. Pilot Generator provides current, upon extinguishment of pilot flame, current ceases and valve closes.



T-100—RELAY PACKAGE

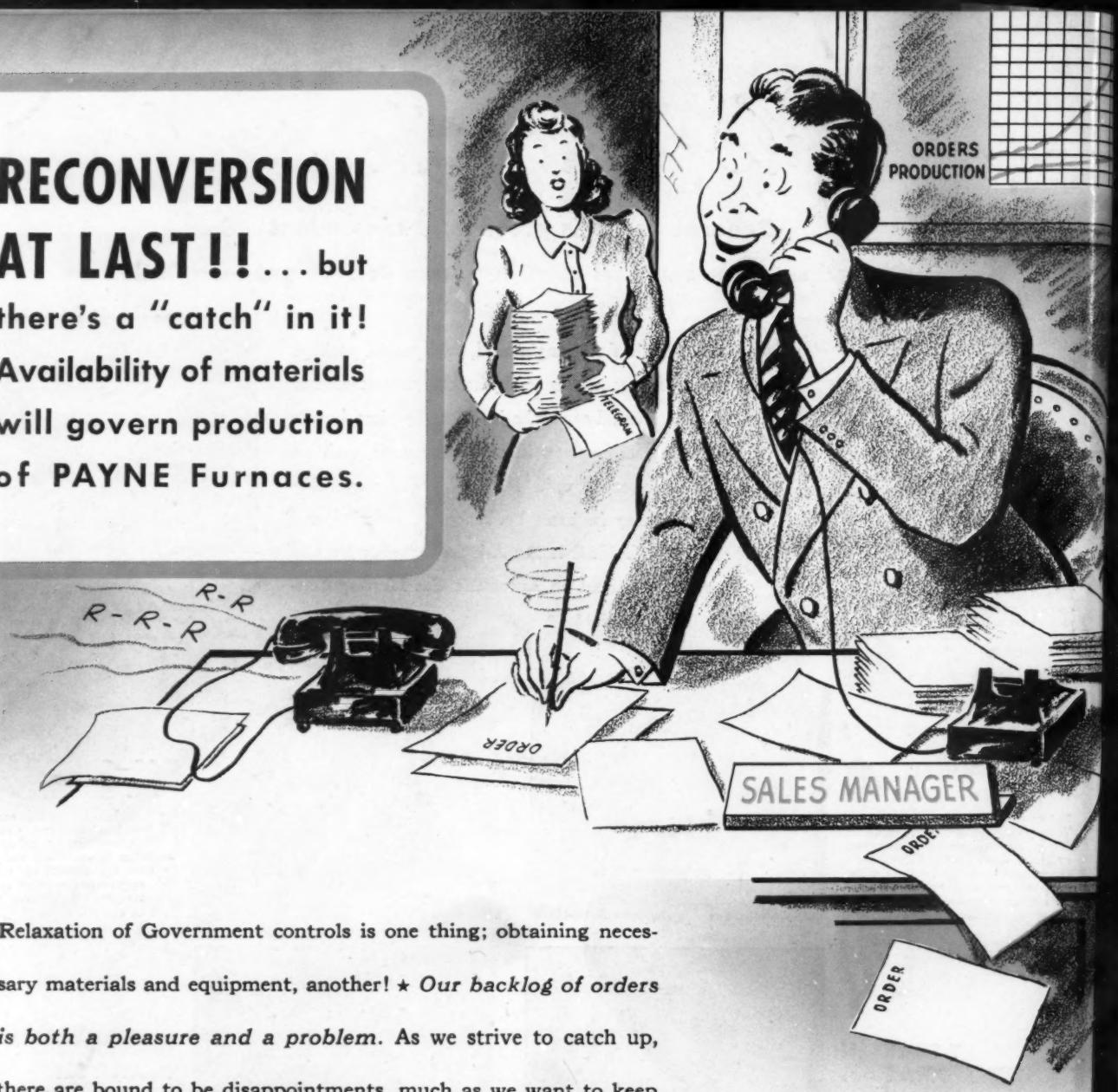
For control of coal stokers, air-conditioning equipment, saw dust burners, blower furnaces, hot water heating, industrial applications. Includes Relay, Thermostat and 30 feet of 2-wire cable. 2-wire, low voltage control circuit.

GENERAL CONTROLS

801 ALLEN AVENUE GLENDALE 1, CALIF.

FACTORY BRANCHES: Philadelphia, Atlanta, Boston, Chicago, Dallas, Kansas City, New York, Denver, Detroit, Cleveland, Pittsburgh, Houston, Seattle, San Francisco. **Distributors in Principal Cities.**

RECONVERSION AT LAST!!... but there's a "catch" in it! Availability of materials will govern production of PAYNE Furnaces.



Relaxation of Government controls is one thing; obtaining necessary materials and equipment, another! ★ *Our backlog of orders is both a pleasure and a problem.* As we strive to catch up, there are bound to be disappointments, much as we want to keep everybody happy. ★ We wish we could give a definite answer to every inquiry about delivery dates and fill every order fully and promptly. But all we can say now is this: Just as fast as materials become available, PAYNE Furnaces will roll off the assembly lines. ★ We know your long-awaited shipment is important to you; it is to us, too! Rest assured that production will be equably allocated among our distributors and dealers. Thanks for your patience.

WORTH WAITING FOR

PAYNE Floor Furnaces; Duplex Furnaces; "Zoneair", "Sentry" and "Spacesaver" Forced-Air Units; Gravity Furnaces and other PAYNE products . . . back soon.

★

PAYNE ZONE-CONDITIONING

Successor to old-fashioned central heating. FREE booklet will be mailed on request.

PAYNE FURNACE COMPANY
(One of the DRESSER Industries)
BEVERLY HILLS, CALIFORNIA

PAYNEHEAT
OVER 30 YEARS OF LEADERSHIP

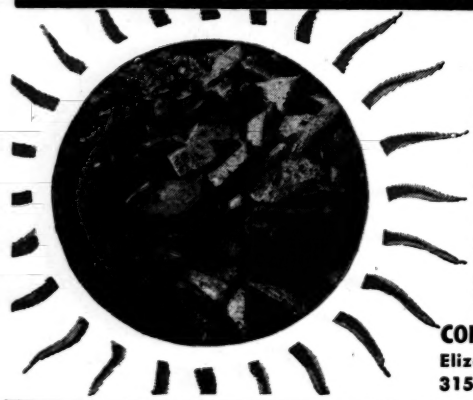
IT'S LIKE *writing* A LETTER HOME

These ads month after month . . . telling you that all of our production is going to war . . . are simply to remind you that the name to remember when you want real snap-acting gas controls after the war is

SPENCER THERMOSTAT CO.

KLIXON
ATTLEBORO, MASS.

CONNELLY IRON SPONGE



High in efficiency . . . low in cost. In hundreds of plants throughout the country, Connelly Iron Sponge has proven itself . . . the finest purification material on the market. Not only does it lower your purifying cost but its high activity and capacity tends to reduce distribution and service complaints because of the cleaner gas which ultimately lowers operating and maintenance costs.

If you have a problem in gas purification, Connelly's 68 years of experience is at your service. Our engineers can help you . . there is no obligation on your part.

CONNELLY IRON SPONGE & GOVERNOR CO.
Elizabeth, N. J. Los Angeles, Calif.
3154 S. California Ave., Chicago 8, Illinois

GAS METER INDEXES AND FITTINGS

Many Standard Meter Parts Carried in Stock

We will be pleased to submit quotations to your specifications and blueprints.

THE E. F. GRIFFITHS CO.

346 E. Walnut Lane Philadelphia 44, Penna.

SEMET-SOLVAY ENGINEERING CORPORATION

Blue Gas Plants
Water Gas Machines
Washer Coolers
Naphthalene Scrubbers
Gas Purifiers
Condensers
Waste Heat Boilers
Producer Gas Plants

40 RECTOR STREET, NEW YORK, N. Y.

Ark.-La. Gas Co. Installs New Regulator Station

The Arkansas Louisiana Gas Co. h recently completed a new regulati station, located on Ford Street, Shrev port, La., replacing the old station a dispatcher's office. This station plies the Southwestern Gas and Ele Co.'s Arsenal Hill power plant w approximately 18,500,000 cu. ft. of daily and also supplies the city wat works.

The newly constructed Ford St station is equipped with sensitrols a valves, a new method of pressure co trol. It is designed to receive gas f the company's own field lines, or f the United Gas Pipeline Corp. By means of control valves, gas can discharged through three 10-in. reg lators to which are attached sensitro into a common header from which th gas passes into the Shreveport syste to supplement the company's supp from other sources, when necessa or it can supply only the electric pla or both.

The regulation of this equipment effected through controls on a pan in the dispatcher's office, eliminati the necessity of visiting individ regulators for each pressure adju ment.

Western Stove Sponsors Suggestion Contest

Gas company employees are eligibl to compete in a "Suggestion Contes now being sponsored by the Weste Stove Co. on the Pacific Coast. Pu pose of the contest is to find out wha improvements the average housewif would like to see in her postwar ga range. The contestant may procure questionnaire form by writing Weste Stove Co., Inc., Culver City, Calif. Th contestant then records what sensible practical betterments she, would enjoy having in her gas range.

The completed questionnaire should then be taken to any Western Holly dealer. Winners receive orders for six-burner automatic "CP" gas ranges, one of which is being given away each week during the 13 weeks.

Wilputte Awarded Two Coke Oven Contracts

In addition to a contract for 177 by-product coke ovens, consisting of three batteries of 59 ovens each, together with by-product recovery equipment, recently awarded to the Wilputte Coke Oven Corp. by the National Tube Co. the Wilputte organization is constructing 47 by-product coke ovens for Citizens Gas and Coke Utility at Indianapolis, Ind. The National Tube project is the largest coke construction contract awarded by the steel industry in recent years.

United Light to Sell Stock In Wisconsin Utilities

The United Light & Railways Co. has filed with the SEC a plan to sell the common stock of the Milwaukee Gas Light Co., Madison Gas & Electric Co. as well as two Michigan subsidiaries which it is to receive on liquidation of American Light & Traction Co. Under the proposed plan, the company would apply the proceeds from the sale of the common stock to the reduction of its senior securities.